March/April 2009 >> Vol.41

AECMAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT



Pure dynamite

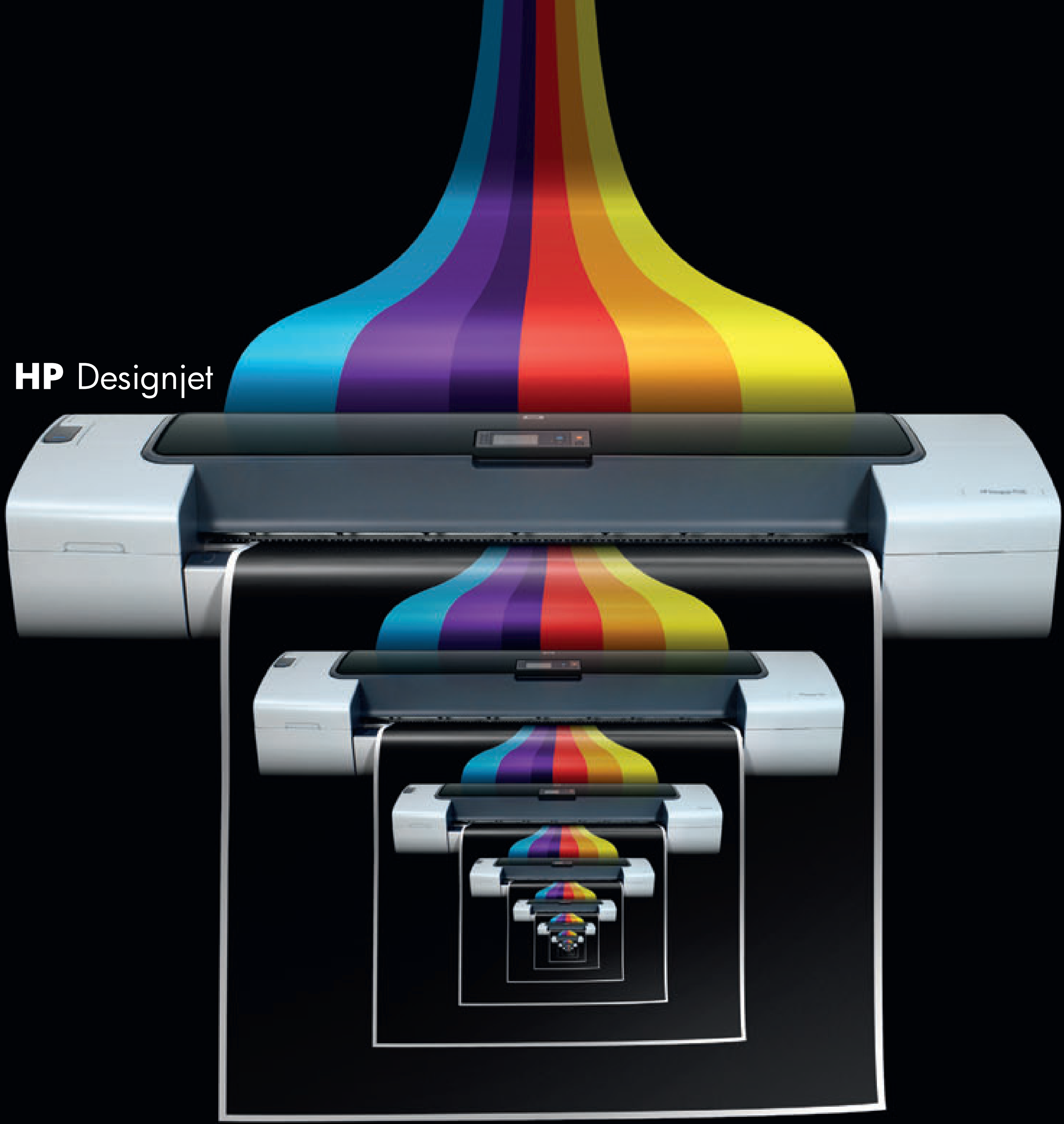
Design visualisation for civil engineers made easy

Autodesk 2010 products

Freeform modelling with AutoCAD and Revit

Image courtesy of Arup / DRD Roads Service, Northern Ireland

Structural engineering • Workstation technology • Free CAD training


HP Designjet

AECMAGAZINE
DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

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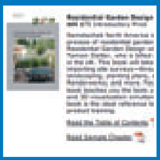
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Vol.41: Contents

Nemetschek announces new Vectorworks guides



Vectorworks tutorials from both Jonathan Pickup and Tamsin Slatter are now available for purchase. The tutorials, which offer step-by-step instructions and a conversational tone, are based on version 2009 but can be used with prior versions of Vectorworks. The books are authored by Jonathan Pickup, a trained architect in the UK and in New Zealand, and Tamsin Slatter, a UK-based garden designer.
www.nemetschek.net/training/guides.php

Plug-in links VectorWorks 2009 to Cinema 4D R11



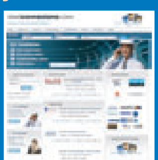
Maxon has updated its plug-in for Vectorworks 2009 and Cinema 4D R11, which allows Vectorworks users to transfer their models to Cinema 4D for visualisations and animations. It is possible to make changes to the model after the visualisation process has started, say the developers, as the auto-update feature in Cinema 4D keeps track of all changes made. ***www.maxon.net***

3D Laser Mapping makes StreetMapper expansion



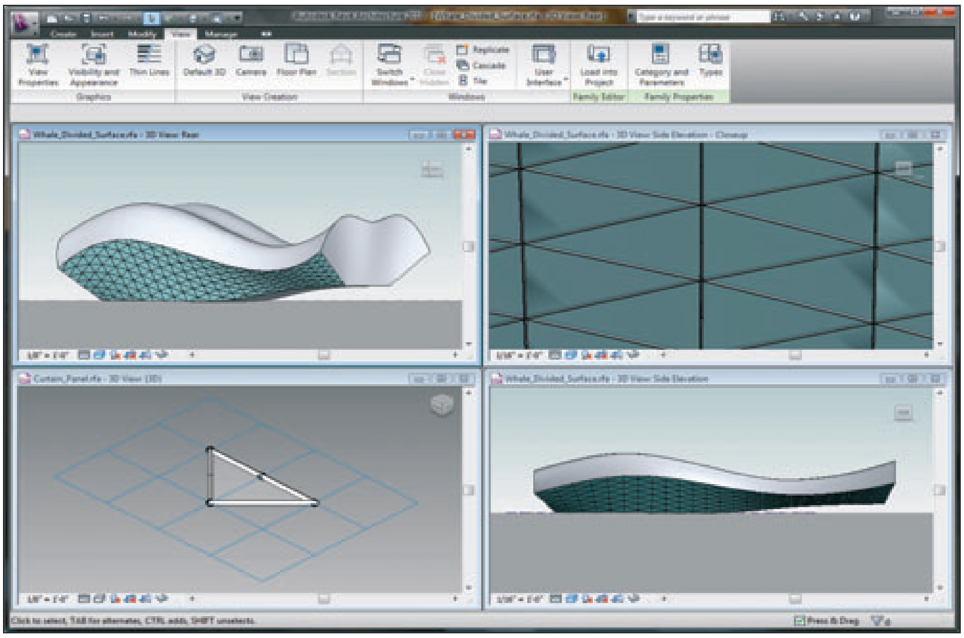
3D Laser Mapping has opened a purpose-built production centre for StreetMapper, one of the first vehicle-based laser mapping systems. StreetMapper 360 has been designed for the rapid 3D mapping of highways, infrastructure and buildings using vehicle mounted lasers. Travelling at normal road speeds, StreetMapper 360 offers a 360-degree field of view with high-precision mapping to a range of 300m, capturing details along the highway corridor including barriers, gulleys and overhead wires.
www.3dlasermapping.com

Dedicated steelwork job website launched



Steel Connexions is a new specialist, web-based job site dedicated to the field of structural steelwork engineering. The site is designed to give industry professionals a meeting place and communication portal for candidates and employees alike. According to Steel Connexions, because the site is dedicated to the steelwork market, relevant candidates are not lost in vast, general databases of applicants. Fabricators, detailers and suppliers can also advertise their services to the sector.
www.steelconnexions.com

Autodesk unveils AutoCAD and Revit 2010 product families



This month, Autodesk is set to deliver its yearly update to its architecture, engineering and construction-related CAD products. Branded 2010, AutoCAD forms the foundation for many industry products: Architecture, Civil, P&ID and Map, together with the company's Building Information Modelling (BIM) solution, the Revit Suite for architecture, structure and MEP.

AutoCAD 2010 has a new DWG format but in return has had incredible power added to it. The new free-form design tools enable users to explore ideas in 3D and create complex freeform models. New PDF import and underlay and enhanced publishing features can improve two-way communication with the extended design team. In addition, the introduction of constraint-based parametric drawing tools means that users can create relationships between objects, accelerating design revision workflows.

AutoCAD LT 2010 remains strictly 2D but incorporates PDF input and output enhancements, additional 2D drafting commands for viewing and editing drawings, and 2D drafting tools from AutoCAD to help increase productivity, including the ALIGN, Xref and Block Attribute commands.

2010 releases of the industry-specific versions have also been announced, including AutoCAD Architecture 2010, AutoCAD Civil 3D 2010, AutoCAD P&ID, AutoCAD Map 3D and AutoCAD Raster Design. Collaboration tools such as Design Review and Navisworks have also been updated.

In terms of the Revit products, Autodesk Revit Architecture 2010 has an enhanced user interface, with a powerful new conceptual design workspace for the creation of complex geometry. Interoperability with programs such as Civil 3D, 3ds Max Design and Inventor has also been greatly improved. Autodesk Revit Structure 2010 includes the same foundation improvements, together with the integration of a multi-material physical and an independently editable analytical model, to help provide for more efficient, more accurate documentation, analysis and design.

Autodesk Revit MEP 2010 now offers native heating and cooling loads analysis, enabling MEP engineers to determine the energy demands of a building. gbXML export has been enhanced with the ability to examine an analytical model of the project before exporting to a gbXML file. Performance has also been increased. ***www.autodesk.co.uk***

Intermap introduces new digital mapping datasets

Intermap Technologies, a specialist provider of digital mapping datasets, has launched two new data products for the UK market, NEXTMap Britain 2 and Optimised TIN Models (OTMs).

NEXTMap Britain 2 is an evolution of the original NEXTMap Britian dataset, which was designed to offer affordable country-wide elevation data and imagery to GIS and engineering users. For NEXTMap Britain 2 Intermap has fused its interferometric synthetic aperture radar (IFSAR) data with other elevation data to increase the accuracy and resolution specifications. According to Intermap, this brings its largely GIS system focused products firmly into the CAD arena with data ideal for the fast emerging 3D visualisation markets.

Optimised TIN Models (OTMs) are claimed to be a more accurate way of portraying 3D elevation information. The 3D data is smaller in size than a raw Triangulated irregular network (TIN) model and, according to the company, is suitable for a wide range of applications including landscape modelling, engineering and design and architectural visualisation. ***www.intermap.com***

MicroGDS

From concept ...

MicroGDS was created for architects and designers. Its unmatched graphics capabilities help you to develop and sell your concepts.





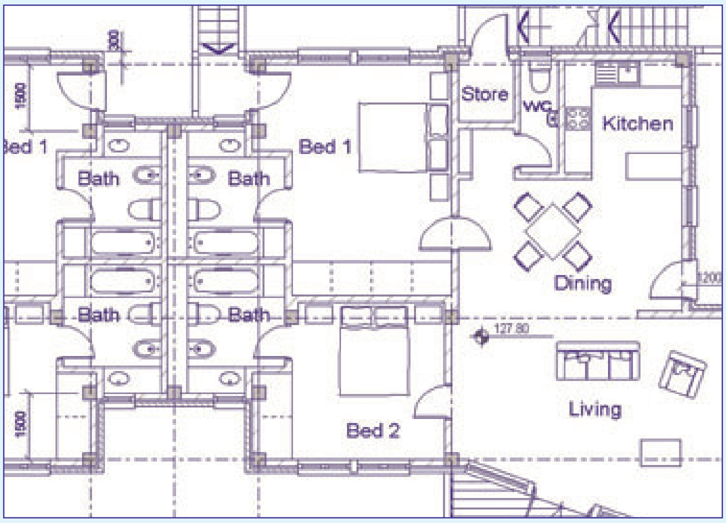
... to construction ...

Production drafting, presentation graphics, 3D modelling, and 3D rendering are all integrated in MicroGDS. You only have to pay once, and you don't need to waste time converting and managing multiple copies of your data.

... on any size project ...

Data capacity is unlimited, so you can grow your project team safe in the knowledge that they can all access project data simultaneously.





... in any organisation

If you need to exchange data with others, MicroGDS supports a wide range of formats including one of the best DWG/DXF translators on the market. There is also a .NET interface for customisation and application development.

The MicroGDS product family and its sister product Piranesi offer CAD users software that delivers a strong return on investment:

- Upgrade your software not your hardware, no need for expensive top-end workstations
- Multi-user access to the same project for quick turnaround of jobs
- PDF generation for easy distribution to all stakeholders in the project
- Assemble Word documents, Excel spreadsheets, and photos alongside your drawings. No need for costly DTP products.
- Solutions for 2D, 3D, single-user and multi-user configurations
- Comprehensive training programmes available
- Small file size for reduced storage costs
- High quality 2D drawings for new business presentations, without the need to use other software, such as Photoshop
- Browse and copy MicroGDS documents across the internet
- High quality WYSIWYG plotting
- Multi-threaded technology making full use of modern processors
- Billions of pounds of PFI work under Design in MicroGDS

Please contact us for more information:

Informatix Software International Limited. 509 Coldhams Lane, Cambridge CB1 3JS
Tel: 01223 246777 • Fax: 01223 246778 • Email: info@informatix.co.uk • Website: www.microgds.co.uk

Images courtesy of Jeff Radwell, Nigel Azis Ltd, London; TTSP, London; Hillier Architecture, USA; Scott Brownrigg, UK.

informatix
Software International

Advanced viz technologies take centre stage at Imagina 2009



70 stands and representatives from over 30 countries lent this year's Imagina event a truly international feel, as industries from across the 3D design landscape were represented.

Visualisation and simulation technology was at the heart of this mixed bag of exhibitors, showing off everything from driving simulators to the latest innovative hardware.

This year saw for the first time a visual effects (VFX) and visualisation seminar built into the conference cycle. Primarily aimed at architects and urban designers covering the interesting topics of what could be learned from Hollywood blockbusters to be built into making a better architectural model, with architect-turned VFX supervisor Eric Hanson, from xRez Studio, sharing his technical skills and experience.

As with all trade shows this year, 3D virtual reality had a strong presence, with nVidia displaying its new 3D Vision system and glasses for use with its GeForce graphics cards, to produce a high-definition 3D stereo solution that can be used to view visualisations.

Also on show was an impressive array of interesting hardware from Immersion, a firm noted for its gaming controllers and haptic devices. The French firm's stand displayed a glowing Cubtile – a multi-touch navigation and manipulator tool with five sides – ideal for moving around 3D sites (pictured left navigating Google Earth). Also on show was a multi-touch table perfect for office meetings that could display, move, zoom and rotate a live feed from a connected video camera.

At the annual awards as the champagne flowed in the glamorous Monte-Carlo surroundings, British firm Squint/Opera, whose concept for New York's Coney Island featured in the November / December edition of AEC, walked away winners of Best Film Promotion. In the architecture and urbanism category, its visualisation of the planned restoration of the historic city of Jeddah showed how the largest city centre project in the country plans to benefit the residents and visitors.

Imagina general manager Laurent Puons, said: "Over 35 percent of the participants in Imagina 2009 were involved in the architectural sector. I am delighted to note that Imagina has established itself as an event that addresses the issues and interests of every member of this community." ***www.imagina.mc***

Transoft delivers bespoke roundabout design tool

Following two years of R&D, Transoft Solutions has unveiled Torus, a swept-path roundabout geometry designing solution based on its AutoTURN engine. To coincide with the launch, the company has also produced a microsite about roundabouts and roundabout design – ***www.designroundabouts.com***



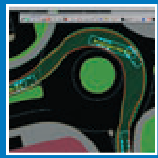
Torus gives designers an iterative tool to create roundabout geometries based on design vehicle movements and clearance offsets. This functionality generates dynamic theoretical edges, ensuring roundabouts are designed based on idealised vehicle swept-path manoeuvres with the geometry and edges to fit the movements. The application was developed around dynamic editing tools which are designed to give users the ability to considerably reduce the number of iterations needed while receiving immediate feedback on fastest drive paths and critical sight lines as the result of design changes.

"The ease of use and flexibility of fastest path checks, sight line checks, design movements and its dynamic immediate feedback are the features that really catch designers' attention," commented Transoft Solutions' senior civil engineer Daniel Shihundu after a launch webcast presentation of Torus. "All of the features and capabilities of this software address the challenges associated with the underlying concepts of roundabout planning and design."

Designroundabouts.com provides a general understanding of modern roundabouts as well as various aspects and advantages of their design. Visitors to the site can browse through roundabout facts, interesting roundabout trivia, the advantages of roundabouts, case studies, and weekly updated video content.

www.transoftsolutions.com

Savoy updates swept path simulation software



Savoy Computing Services (SCS) has made a new version of its swept path simulation and analysis software, AutoTrack 8.5, available. The software includes several major new features and enhancements that meet the specific requirements of transport engineering and planning worldwide. AutoTrack 8.5 is natively compatible with AutoCAD and now PowerDraft and the Bentley MX suite. ***www.savoy.co.uk***

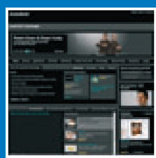
Project Dragonfly takes off in Autodesk's labs



Project Dragonfly is a new Autodesk Labs technology preview of a web-based architectural planning tool. Based on a new Flash-based model editor, it's simple to use and runs on any operating system that has a web browser which supports the latest Flash plug-in. Having been designed as a web application, this product, together with others on the Labs website, may give an insight into Autodesk's strong intentions to develop more web-based applications.

dragonfly.autodesk.com

Autodesk opens doors to online AutoCAD community



AutoCAD Exchange is a new online destination for AutoCAD users to connect and learn from experts, provide feedback to the product developers, and access professional tools designed to help them do their jobs better. The online community, developed by Autodesk features original multimedia content, eLearning tools and aggregated CAD information from Web-based resources. Visitors can also create profiles to personalise their experience and share their own tips, scripts and applications, projects and experiences with the global community of AutoCAD users.

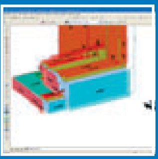
www.autocad.autodesk.com

Virtual Reality rooms unlock door to the brain

People walking through virtual buildings are the latest to be studied by scientists investigating how memories are created, stored and recalled. Scientists at University College London are conducting tests to find how Alzheimer's disease and strokes destroy our memories and find ways for rehabilitation.

Results show how the pattern of activity in their hippocampus encodes a person's location in the virtual world, allowing scientists to predict where each volunteer is 'standing'.

CSC invests in wind speed analysis software



CSC has purchased the copyright to the BREVe software, which automates the design wind speed and dynamic pressure clauses of BS6399-3 and EN1991-1-4 for any site on the UK National Grid. Using a combination of wind speed maps, Ordnance Survey height data and the BRE's ground roughness data, BREVe determines the design wind speeds approaching any site from any direction on the UK mainland. BREVe is embedded in CSC's Fastrak Building Designer allowing the software to automatically determine wind pressures acting on an entire building.

www.cscworld.com

Jigsaw takes on specialist workstation manufacturer



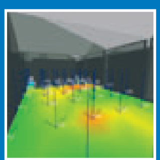
Jigsaw Systems, a supplier of specialist IT products and support services to the creative industries in the UK, has been accredited to sell and support BOXX Technologies' high performance computing platforms in the UK. BOXX workstations and render farms have been popular with architects and design visualisation professionals for a number of years. ***www.jigsaw24.com***

Free AutoCAD clone released with parametrics



On the same day that Autodesk unveiled AutoCAD 2010, which features new parametric constraint-based drafting functionality, IMSI, the developer of TurboCAD, simultaneously released DoubleCAD XT, a free AutoCAD clone, which also features 2D constraints. With this new release it is clear that IMSI is targeting AutoCAD LT users, which costs approx £1,000 and does not offer constraints. If nothing else, this is good guerilla marketing. ***www.doublecad.com***

3ds Max Design 2010 advances lighting analysis



Autodesk 3ds Max Design has been revamped for its 2010 release and offers more than 100 additional modelling tools help designers explore form making, while refining their designs with a new render-quality viewport display. An interactive lighting analysis utility is designed to help architects validate sustainable solutions in real time and avoid costly mistakes early in the design process.

www.autodesk.co.uk/3dsmaxdesign

New owner to drive development of Piranesi and MicroGDS

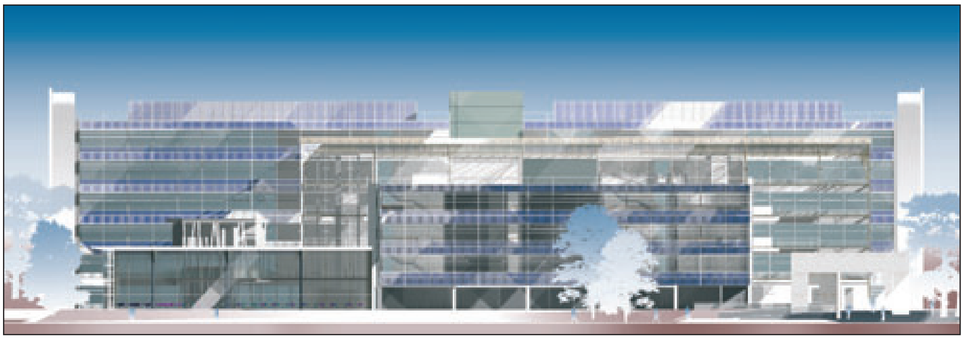


Image courtesy of Architect, ttsp, London. Created by Marco Crawford (ttsp) Using MicroGDS and Piranesi.

Against the trend of global recession, acquisitions are still taking place, with the takeover of the UK business of Informatix Software by British firm Selective Software Holdings (SSH).

Both MicroGDS, the 2D and 3D CAD solution for architects, engineers, facility planners, and interior designers and Piranesi, the non-photorealistic visualisation tool for conceptual design, have been saved from the economic downturn by a company aiming to revitalise the brands, with new releases scheduled for later this year.

Managing director Steve Evans is convinced that there's still an opening for the software in the global AEC market. Describing how SSH plans to drive forward the business, he said, "It's to invest in the development of the business, to grow the customer base of MicroGDS globally and enhance the existing customer base.

"We will be releasing MicroGDS 11 before the end of the year, which will have the first in-road into BIM [Building Information Modelling], then we will be releasing Piranesi 6," he added. A new global training programme for new and existing customers is also being set up and will be managed both within the company and through its resellers.

In addition to this expansion the company is also looking to recruit MicroGDS global reseller partners, having already signed up with Computers Unlimited for Piranesi.

"Over time we're looking to add complementary packages to the range," concluded Steve, proving that the smaller companies in the industry still have optimism.

www.informatix.co.uk

Students explore models in real time using avatars



Virtalis, a virtual reality specialist and UK reseller for WorldVIZ hardware and software, has implemented a new real time interaction technology at the University of Wolverhampton. Students on the Architectural Visualisation degree are making use of Live Characters, a new feature of WorldVIZ's Vizard software to interact with a virtual environment with the system accurately mimicking their movements in real time using motion capture.

David Heesom, course leader, explains, "Our students love these avatars. They can have fun with them and even populate their designs with virtual versions of themselves. We bought 20 licences plus additional light versions which allow the students to work in Vizard on their own PCs at home. This means they can develop their work on PCs and then display it to others on our 3D projection system." ***www.virtalis.com***

Desktop Engineering offers Digital Project R4

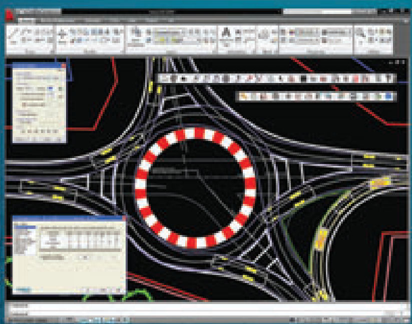
A new version of the building design and development software system from Gehry Technologies is now available in the UK from Oxford-based Desktop Engineering.

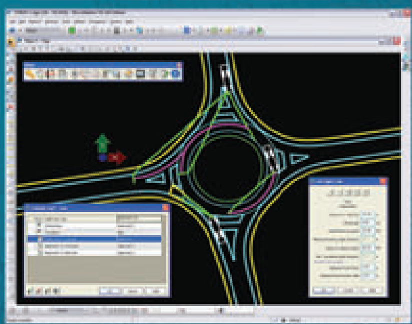
Digital Project (DP) R4 features a number of new improvements including: enhanced drawing generation capabilities, the full release of architecture and structures functionality, enhanced IFC interoperability and the addition of rendering in the system's Designer configuration.

Geoff Haines MD of Desktop Engineering said, "This new software release gives the AEC industry higher levels of productivity by incorporating the most advanced design-to-build methodology yet devised. DP is based on the same software used by Boeing, Toyota, and thousands of other companies to generate innovation, quality and business benefits through the application of 3D digital model based PLM technology."

Digital project is used by a number of leading architects and building development organisations including Zaha Hadid, Herzog and de Meuron, SOM, ARUP and Aedas. It is currently being deployed on a wide range of high-profile projects throughout the world including: The Aquatics Centre for the 2012 London Olympics, The Abu Dhabi investment Council, The Gazprom Tower and the spectacular ArupSport, Shakhtar Stadium in Ukraine. ***www.dte.co.uk***







Join the roundabout revolution – the **TORUS revolution** that is!

BENTLEY Technology Partner
Autodesk Authorised Developer

Let Transoft show you how.

TORUS, driven by patent pending technology and Transoft's highly popular AutoTURN engine, is destined to become the defacto standard for roundabout design.

Based on user defined design criteria, including inscribed circle and central island diameters, entry and exit radii, etc, the software automatically generates truck aprons, circulatory widths, splitter island envelopes and layout geometry - all the while taking into consideration the swept path needs for negotiating the various turns.

Torus features includes automatic and easy to use safety analysis functions in the form of output of fastest travel speeds through the roundabout and stopping sight distances checks.

TORUS's interactive and dynamic functionality is simply icing on the cake! TORUS does it all – it's a must have.

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TEKLA Structures 15
www.tekla.com/uk

Bentley launches Be Employable

In a generous move in these troubled times, Bentley Systems has unveiled an initiative to give unemployed AEC professionals access to the latest versions of MicroStation with online training, for free. **Martyn Day** asks what it is all about.

We all know things aren't exactly rosy out there in the job market at the moment and our thoughts are with those readers that have found themselves unexpectedly in-between jobs. While there are some signs that the situation has perhaps plateaued (fingers crossed), getting back to work will still be a challenge. With this in mind, one major AEC CAD vendor, Bentley Systems has launched an initiative that allows unemployed professionals to get access to the latest tools and training for free.

Called 'Be Employable', the offer is a really well thought out selection of software, training and access to the company's professional Be Careers network. On the software front, those that sign up get access to Bentley's V8i software portfolio for non-commercial use. The extensive list of software available includes the most popular Architectural, Civil and GIS flavours of MicroStation V8i: Bentley Architecture/Structural and Mechanical/Electrical Systems, PowerSurvey, PowerCivil, StormCAD, SewerCAD, WaterCAD. WaterGEMS, GeoPAK, Map and Descartes.

In terms of training, once registered you get access to any course that's available on Bentley's LEARN Server, which is an on-demand eLearning companion to Bentley SELECT (subscription) customers. On top of that you can attend live scheduled courses. Every on-demand course you take earns credits and the system keeps track to see the volume of courses taken. This produces a 'transcript', which can be used as part of a CV to demonstrate MicroStation skill level.

Signing up

To qualify, during the registration process you have to confirm your employment status, providing the name of your most recent employer. You then join Bentley's social and professional networking site (also for free), called Be Communities, which includes blogs, wikis, tips and tricks and forums. There is also a Resume Centre where you can post your qualifications for browsing HR departments.

This is a very generous and well thought through offer and we fully back this initiative. It's made possible through Bentley's investment in the development of its SELECT program and on-line training Institute server infrastructure. While this is the backbone of Bentley's business model, it just so happens to allow Bentley to facilitate grand gestures like this. I don't know of any other CAD vendor that has equivalent enabling infrastructure.

To discuss the initiative I talked with Joe Croser, global marketing director, platform products at Bentley Systems. Croser explained: "We recognise that there are tough economic challenges facing our infrastructure customers and we wanted to offer something to maintain or enhance skills and maintain continual professional development credits while they look for new work. We have the software, distribution mechanism and professional network to make this happen and we really want to enable professionals to resume their careers as quickly and easily as possible."

The benefit to Bentley is in potentially winning some converts over to their software, but for anyone else it's surely a big plus to be able to claim proficiency in Autodesk and Bentley products. Looking the gift horse in the mouth, I asked Croser why Bentley was doing this. He replied: "This isn't about us making money. From our perspective, it's a stimulus to the economy. Only a year or two ago, in the press and at conferences, people were talking about the shortage of engineers and the demographic time-bomb we faced. All that has changed because now there are more unemployed professionals seeking fewer jobs.

"We have found ourselves with this hopefully very small window to train professionals, to help them increase their skill sets. So when they find new work they will be more productive, using the latest and best technology. We have no doubt, the time will come again when we lament the shortage of experienced infrastructure and building professionals. To Bentley, it therefore makes good investment sense to help people skill-up now. It is good for individuals, good for firms and good for clients because it means that they will all be more competitive on future projects."

While the Be Employed offer runs until the end of this year an extension to this will be reassessed by Bentley nearer the time. Croser explained: "Because our SELECT server licensing enables this offer and it's online, if we choose to extend the program because the economy is still sluggish and many people can still benefit from skilling-up then we will probably extend it. People won't need to do anything to extend their software use, as we can alter it at the server-side."



Joe Croser: ***"This isn't about us making money. From our perspective, it's a stimulus to the economy."***

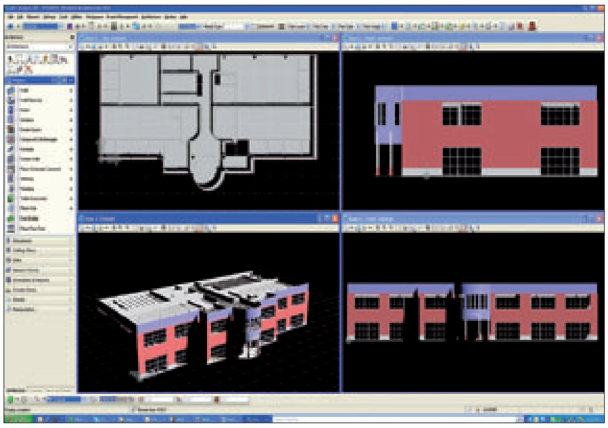
Conclusion

To be able to maintain legal access to high-end design software, get unlimited training, support and be put in front of potential employers, all for free, is probably the best bit of news we have come across all year. Well done and thanks Bentley Systems. I hope the other key vendors follow suit soon.

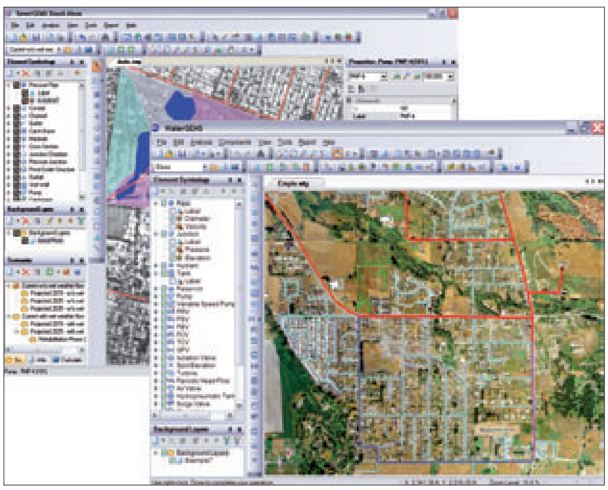
www.bentley.com/beemployable

"To Bentley, it makes good investment sense to help people skill-up now. It is good for individuals, good for firms and good for clients because it means that they will all be more competitive on future projects"

Joe Croser, *global marketing director, platform products at Bentley Systems.*



The MicroStation V8i Architecture is one of the software solutions that Bentley is offering for free to unemployed professionals to download with access to online training.



Bentley Systems is offering a wide range of vertical tools to unemployed AEC and Infrastructure professionals. WaterGEMS V8i is the company's solution for fire flow and water simulation, to criticality and energy cost analysis.

Autodesk Design Computation Symposium

At last year's Autodesk University, **Dr Robert Aish** hosted a Design Computation Symposium for architects and construction engineers to see how computers can assist in design creation.

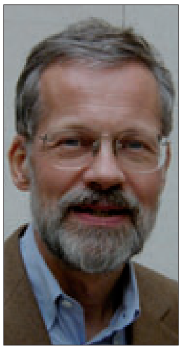
Under the stewardship of chief executive officer, Carl Bass, Autodesk has accelerated its development of and experimentation with new design technologies. Some of this work has been done in-house, part by acquisition, but there have also been some strategic staff additions, one of which is Dr Robert Aish, former director of research at rival, Bentley Systems.

Dr Aish had developed Generative Components (GC), a parametric modelling system which ran on top of Bentley MicroStation. The software was widely adopted by firms that were at the cutting edge of design modelling. GC provided a tool to enable very complex forms to be generated and manipulated using algorithms. Leading practices such as Foster + Partners, KPF and Arups were all experimenting with the system to create rules-based designs, which could be quickly re-calculated should the underlying geometry change. While still in extended beta, some buildings and bridges were designed and built using GC.

"With a company the size of Autodesk, and not forgetting the massive resource capability, here Dr Aish's vision of 'programmatic design for all' could be best popularised"

At the time Autodesk's approach to this need for free form design was to push 3ds Max or Maya but these were not similar parametric solutions. With Autodesk's aspirations to move up the food chain and provide tools to signature architects, it recognised that it had to have some new technology tailored to these very specific needs. The net result was Dr Aish leaving Bentley Systems to join Autodesk and to think through the solution from scratch. Dr Aish had the pick of Autodesk's vast toolkit of 3D technologies and oddly enough, ended up in the platform development group, working with good old AutoCAD. From this positioning, we can assume that Mr Dr Aish's new code will serve as a platform-level technology, available to many industry groups.

Having had a little less than a year at the company, Dr Aish's first Design Computational Symposium at Autodesk University in Las Vegas, was also his first public outing. With nine industry speakers and Carl Bass on hand, the presentations explored many different types of situations where the computer can take the processing load off the designer: allowing multiple solutions to be devised in minutes; using simple software to create projects of great complexity; enabling models to feed back structural and sustainability performance; allow the design of adaptive systems for buildings; rapidly optimise to best suit design intent; aid digital fabrication and using algorithms to integrate both architectural and urban design briefs, to computationally derive the best fit.



Dr Robert Aish had the pick of Autodesk's vast toolkit of 3D technologies and ended up in the platform development group, working with AutoCAD.

A Generative Components user describing how they have used programmatic solutions to produce sophisticated results.



The events were very similar to Mr Dr Aish's Architectural seminars traditionally held before Bentley's yearly gatherings. This was, perhaps, to be expected, with many familiar faces and projects at the event, although this time there was AutoCAD, Ecotect and Inventor. What was more significantly different was the audience, which were, by and large, from practices that were nowhere near investigating GC, let alone dabbling in 3D.

It's from talking to these attendees that you can, in part, see why Dr Aish has joined Autodesk. With a company the size of Autodesk, and not forgetting its massive resource capability, here Dr Aish's vision of 'programmatic design for all' could be best popularised.

While the technology is still young, there was a brief demonstration of some new code running on AutoCAD. At the moment, Dr Aish calls it D Sharp (a play on Microsoft's C Sharp language) and it's a totally brand new programming language that provides a relatively simply way of building relationships between standard AutoCAD geometry.

The demonstration showed a 3D tree-like support structure that would snap to the AutoCAD baseline grid but would deform the 'roof' surface above it, wherever it was moved within the model. Unfortunately, photographs and videos were not allowed, so for now, I can only describe it. It would seem that 'D Sharp' may well extend beyond AutoCAD but for now, that is the target platform. As 'D Sharp' is essentially a language based on defining relationships and is not a geometry engine, it could eventually be applied to other Autodesk products, as parametric design is useful across a broad range of application areas.

Bentley Systems is obviously a tad concerned at what Dr Aish is developing at Autodesk. His loss certainly accelerated Bentley System's promotion and development of GC within the architectural community. However, looking at McNeel & Associates' exciting Grasshopper parametric technology for Rhino, it's obvious to see that this programmatic approach to design is really starting to gain momentum.

Conclusion

It is always exciting when there is a technology bun fight, an arms race if you will. With the best minds on all sides coming up with better, faster and cheaper ways to wow us with tools that ultimately let amazing forms be realised and built. All this technology means sophisticated results at the same cost for a boring rectangular building.

www.autodesk.com

AutoCAD 2010 releases

It is that time of year again when Autodesk retires an old version of AutoCAD and introduces a new generation. Featuring 2D parametrics and conceptual 3D, AutoCAD 2010 represents a change of direction for the industry de-facto standard. **Martyn Day** and **Paul Woddy** give us their views of the product launches.

The first thing that is apparent about the launch of the new AutoCAD is just how many products Autodesk now develops and supports. Since Carl Bass took over stewardship of the company there has been an explosion of products, especially those that are 3D capable, together with analysis and visualisation. The days of Autodesk being a one horse town are well and truly over.

The 2010 product catalogue has swelled over recent years as Autodesk's AEC division has covered more industry areas and acquired more companies and technologies. Platform products include AutoCAD and LT for the base for AutoCAD Architecture (formerly Architectural Desktop), AutoCAD MEP (Mechanical Electrical and Plumbing), AutoCAD Civil and Civil 3D, AutoCAD Map and AutoCAD P&ID (for Process Plant). For project document distribution there is Buzzsaw, Design Review and NavisWorks. On the analysis side Autodesk now has Ecotect, Green Building Studio and Robot Structural Analysis. Design Visualisation is supported through 3ds Max Design and Maya, with Project Newport still in development. And these are just the products I can remember off the top of my head, without mentioning Revit Architecture, Revit Structure and Revit MEP.

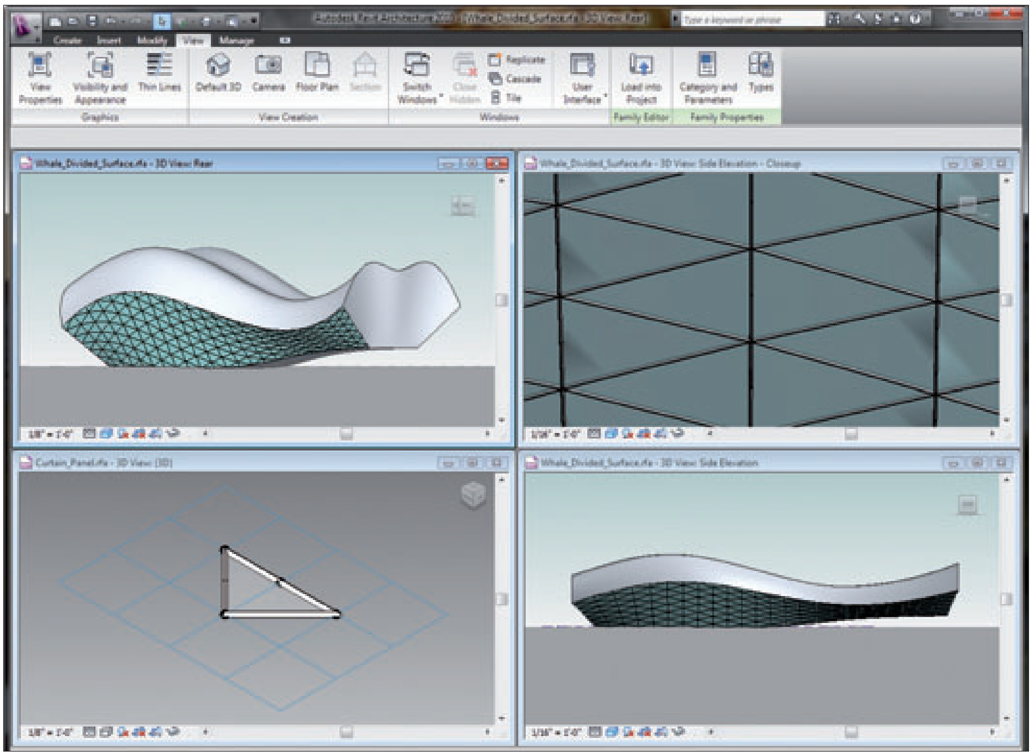
While we have not yet had the opportunity to review the products themselves, we can report back on the features identified at the launch events. However, Paul Woddy, our Revit Guru, has clocked up some time on a recent beta of Revit.

AutoCAD 2010

AutoCAD 2010 (Autodeskers call it 'twenty ten') has had 2,000 beta testers and some of the features were released to Autodesk Subscription customers last year. To go with all the powerful new features, unfortunately, 2010 introduces a new DWG file format but there is a built-in 'SaveAs' function that allows users to save drawings to and from AutoCAD releases using previous DWG formats. In addition, the SaveAs AutoCAD Release 12 DXF command supports releases prior to AutoCAD 98.

The first thing you will notice is a simplified and intuitive ribbon interface, which organises tools into tabs, which represent workflows such as creation, annotation and collaboration. Each tab contains a series of panels - a group of tools used to accomplish that part of the workflow. The ribbon is now consistent between most Autodesk programs allows users to move between programs more smoothly.

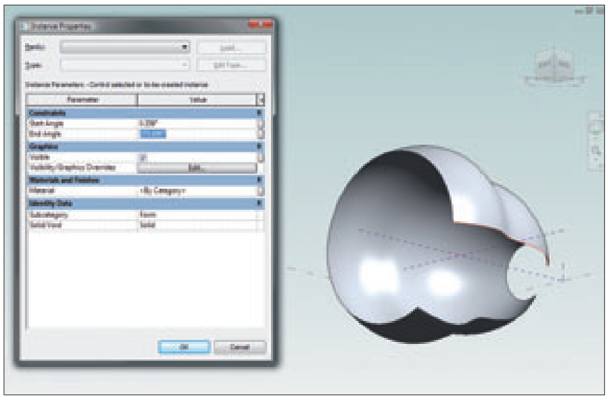
Looking at 2D the most obvious enhancement is the introduction of parametrics. To the uninitiated, parametrics allow the user to apply persistent relationships between geometry, parallel lines remain parallel and concentric circles remain centred, all automatically. In AutoCAD 2010 these can be applied manually or automatically to any 2D geometry, with control over tolerances. As constraints are added icons appear next to the lines giving immediate feedback to the user. Constraints can even be added through dimensions, by editing the dimension, the drawing updates with the new length or angle. A management dialogue provides a comprehensive way to see all the constraints in a drawing where all the values can be seen and edited. This is brilliantly powerful stuff, with a very simple user interface and will be incredibly useful to many, many users.



New conceptual design features in Revit Architecture help users prepare models for fabrication and construction with built-in tools for dividing and patterning complex forms.

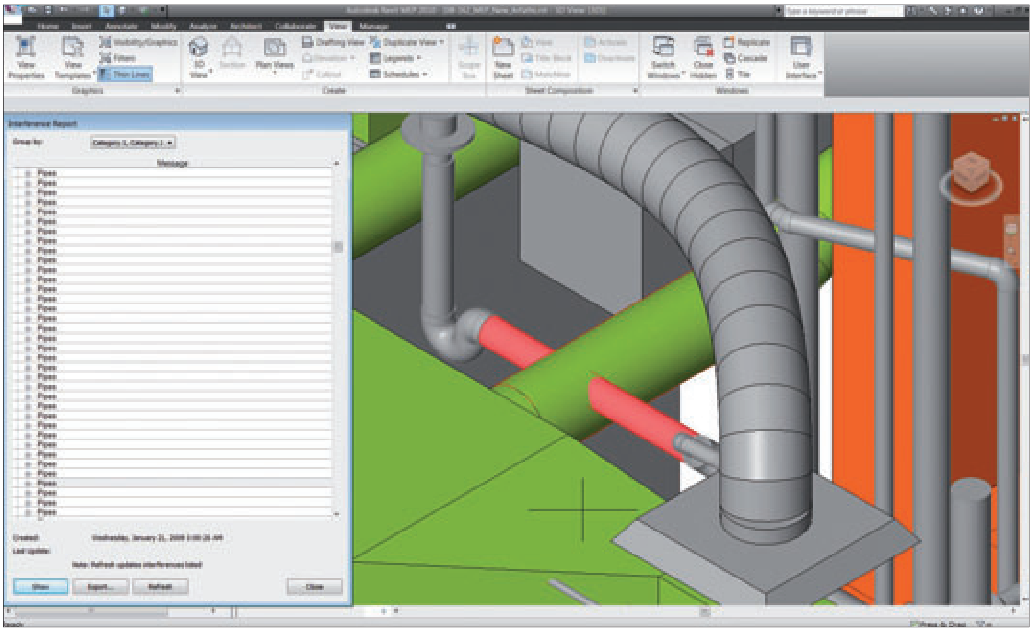
PDF has been updated. Users can now plot to PDF with much more control. AutoCAD 2010 supports higher resolutions, better font handling for true type fonts (making PDFs searchable). PDFs can now contain layer information and can be attached as an underlay. To export to DWF or PDF there is a combined dialogue for the selection of settings.

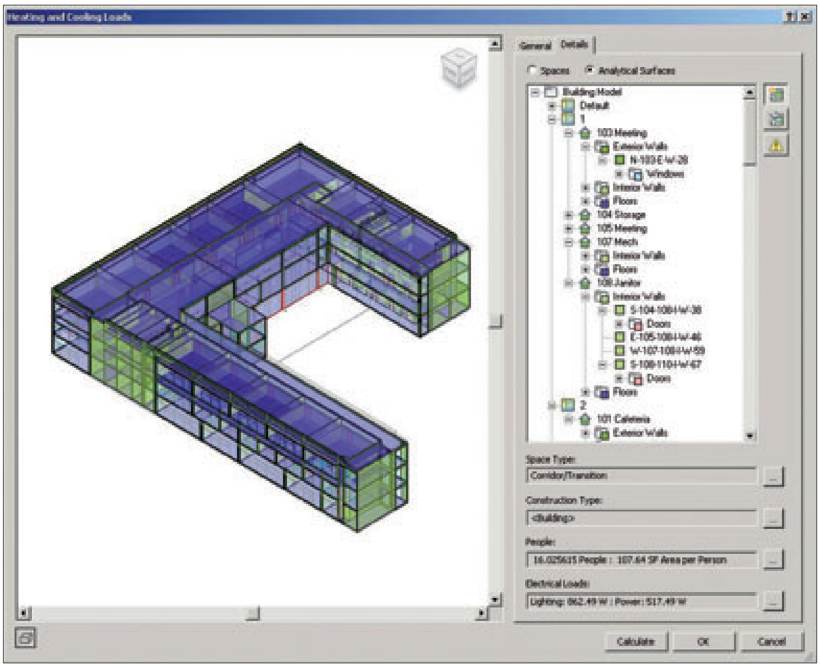
There are quite a few other improvements to the 2D feature set, like Hatch editing, so it would be worth checking the product data sheet or getting a demonstration from your local dealer. However, what is more impressive in this release is just how much AutoCAD has had its 3D capability beefed up, almost out of all recognition.



Revit Architecture now allows you to sketch freely, create 3D models quickly, and take your design from concept to construction documentation all-in-one environment.

AutoCAD 2010 now offers surface freeform modelling. The 3D workspace has been updated and users can start a session by selecting from a range of primitives. Simply push/ pull faces, edges, and vertices to model complex shapes, add smooth surfaces, and much more. It is possible to interactively create any shape and it looks really fun and easy to use. The new modelling capabilities provide conceptual designers with something to stick their teeth into and attempts to blow away the modelling capabilities of products such as SketchUp.





Above: *Optimise workflows in Autodesk Revit MEP by linking and managing central architectural and structural models to MEP working files.*

Left: *Autodesk Revit MEP provides native integrated heating and cooling load calculation tools to help engineers perform energy analysis, evaluate system loads, and produce heating and cooling load reports for a project.*

Autodesk has also enabled AutoCAD 2010 to connect to a remote 3D Print service, so prototypes can be delivered to your door, or if you are advanced enough to have your own desktop prototyping machine 3D print it there and then.

AutoCAD LT 2010

The difference between LT and its big brother has been growing for a number of releases now. LT is most certainly a 2D workhorse. This time around, LT gets: the updated ribbon interface, the new DWG format with backwards capability, AutoCAD 2010's PDF improvements and underlay capability, enhanced External Reference commands for in place Reference editing and clipping, more Block Attribute commands and Align Objects.

AutoCAD for Architecture

Formerly Architectural Desktop, AutoCAD for Architecture has undergone a considerable realignment within the Autodesk AEC portfolio, specifically with regard to the growing Revit solutions and its exclusion from the world of Building Information Modelling (BIM). It has been noticeable that Revit has been getting many more of the new exciting 3D features, achieving greater product velocity than AutoCAD for Architecture.

AutoCAD for Architecture gets the great conceptual benefits of the new modelling and surfacing tools in the underlying AutoCAD, as well as all the other UI and 2D goodies. These are certainly not inconsequential, but there are only a handful of enhancements flagged up for AutoCAD for Architecture.

Walls have seen some neat updates for drafting productivity again this release. Trim and Extend have been joined by Fillet and Chamfer, providing more control in designing walls and end-caps as they will actually be constructed in the field. There is a new 'Space Separator' tool, allowing users to automatically divide spaces that are not bound by walls with plain AutoCAD linework. A new flip text position grip for AEC Dimensions has been added, giving users additional control over the placement of text. There is an improved stairs feature, allowing the inclusion of a distinct 'ramp' type, which comes complete with its own display and annotation tags (Percentage Tag, Degree Tag and Numeric Tag).

AutoCAD Architecture software is interoperable with certain Autodesk products and third-party applications for specific needs, allowing for more effective collaboration with extended design teams. For instance, Part files and assemblies from Autodesk Inventor can be exported to AutoCAD Architecture software as MV Blocks, meaning that 2D and 3D views of the imported content is possible. Also when exporting designs via industry foundation class (IFC), relevant space boundary information is now attached for proper energy analysis for AutoCAD MEP software.

AutoCAD MEP 2010

Talking of AutoCAD MEP (Mechanical, Electrical, Plumbing), there has been a range of drafting and co-ordination improvements. Workspaces are better tailored for tasks such as HVAC and piping systems in ready-made formats, which are also highly customisable. Gravity based designs for Sanitary Drain, Waste, Vent and Storm/Sewer drainage systems can now be drawn more easily with the new sloped piping functionality. Pipe routing preferences have been expanded to include parts with male and female connections.

Catalogue support has been enhanced, supporting individual catalogues for different material types, allowing for easier part selection. There is also better migration of existing customised catalogues with tools to redefine the catalogue-based content in existing drawings, and upgrade and add new parameters automatically. It is also possible to import manufactured building components from Autodesk Inventor.

As you would expect, new part content has been added and there have been enhancements to the Content builder, allowing users to create custom parametric parts with male, female or a combination of both connectors based on real-world piping requirements. Autodesk's Seek web service has also be integrated, enabling designers to search a vast library of 2D and 3D building products and publish customised designs to the service.

AutoCAD Civil 2010

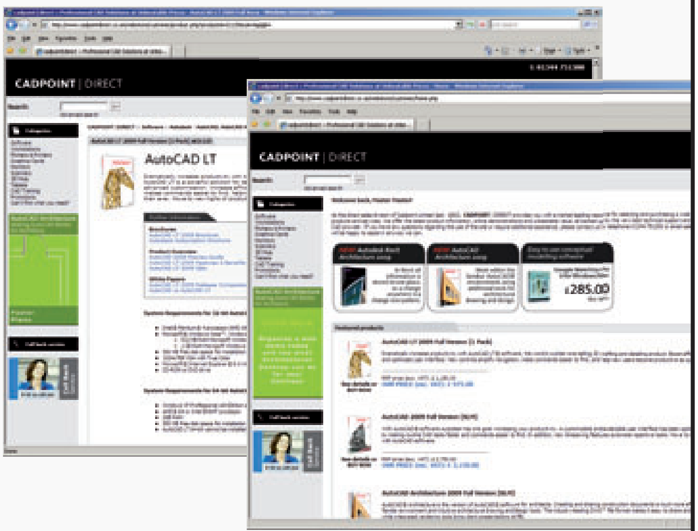
On top of the 2010 AutoCAD enhancements, Civil gets some attention to its surveying and Design components. A new 'Intersection Design' wizard helps take the complexity out of modelling typical intersections and facilitates the creation of dynamic 3D intersection models, helping to automate the creation of intelligent intersections that can be updated more easily when the design changes.

Survey data can be processed directly from the field without tedious translations or conversions and parcel generation offers a more streamlined workflow, based on frontage offset, minimum width, and minimum and maximum depths.

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Autodesk 2010 Product Portfolio



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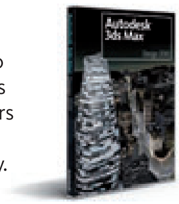
AutoCAD LT
AutoCAD LT® software is known for its efficiency, power, and reliability. And now it's better than ever. Professional drafting and detailing software now has even more ways to increase productivity.



AutoCAD Architecture
AutoCAD® Architecture 2010 software is the version of AutoCAD software for architects. AutoCAD Architecture offers immediate productivity for architects familiar with AutoCAD software.



Revit Architecture
Autodesk Revit Architecture 2010 software works the way architects and designers think, allowing users to work more naturally, design freely and deliver more efficiently.



3ds Max Design
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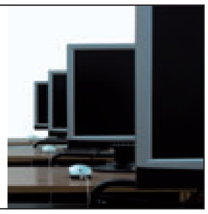
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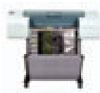
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Two new design tools have been introduced: Alignment Offsets for synchronising offsets to the original alignment, and Alignment Masking for controlling alignment and label displays beyond the functionality of the alignment styles.

Conclusion

AutoCAD 2010 is a major step for Autodesk. Internally it seems the product teams have decided that they can't suppress AutoCAD's functionality any longer and have added parametrics and relatively high-end modelling. This may impact Revit and Inventor migration, however the company has perhaps finally realised that many customers are happy with basic AutoCAD. This is especially pertinent given that the people behind TurboCAD, IMSI have launched a free-to-download AutoCAD clone called DoubleCAD which also features parametrics. With a tough economic climate AutoCAD seats and subscriptions will surely come under some pressure, it seems like the decision to beef up AutoCAD's functionality came at the right time.

There has also been a 5 percent price increase, across the board. It's best to contact your dealer to get local information on on this may affect you. Perhaps the worst impact will be on AutoCAD LT which already appears to be increasing in cost quicker than a bank bailout. With increased competition, an economic meltdown and a number of alternatives for 2D drafting it is perhaps not the best timing for this.

The DWG file format change will again cause disruption in the market and may well delay company roll-outs of the 2010 products. It's of note here that Autodesk didn't include the native MicroStation DGN file format technology that they cross-licensed from Bentley Systems last year, this will surely appear in the next release, if not streamed in to the new updates available to Subscription customers, delivered throughout the year.

The product Tsunami that Autodesk unleashes every year just gets bigger every time. With increased effort spent on addressing compatibility limitations though the product range, Autodesk is finally sorting out the muddle created by having so many products developed by different teams, on different code. 2010 marks the first concerted effort to enable models and drawings to be shared and swapped between the various AutoCAD flavours as well as the mechanical products like Inventor.

As to AutoCAD Architecture vs Revit, again, yet another release that makes it clear that Revit is the architectural product of choice with only a few minor 2D additions to the AutoCAD-based AEC flavour. Revit's functionality is expanding at an amazing rate and with a huge groundswell of architectural and structural firms piloting projects, it seems migrating to Revit is the only way to get a dynamically evolving AEC solution from Autodesk.

While it may well take the rest of the year to work our way through reviewing these products, on paper at least, it seems as though Autodesk will deliver a good release of AutoCAD.

www.autodesk.com

The Revit 2010 Suite by Paul Woddy

I have been using Revit pretty much every day since release 2.1 and for the first time since those early days, I stare at the screen in confusion, wondering where to start. It is not that a lot has changed in what the software does, or the principles of how it does it, and if you use keyboard shortcuts you should hardly miss a beat. The changes to the user interface (UI) have been threatened / promised for several years and have arrived with a bang so where the old interface felt like a pair of comfortable old carpet slippers, I now appear to be wearing a sparkly gold pair of Jimmy Choos.

Gone are the design bars down the left of the screen; gone are the toolbars across the top of the screen; no more the ever-present Type Selector pull-down and the Element Properties button. All my constants in life have evaporated! In return we get Ribbons, in a move mirrored by most of the Autodesk product range. The concept is not dissimilar to the old design bars in that commands are grouped by context; the difference here is that the whole screen adapts to the task in hand so that almost all available menu space is dedicated to the current operation. Sounds great, assuming that the boffins have correctly understood how our minds work when we operate Revit.

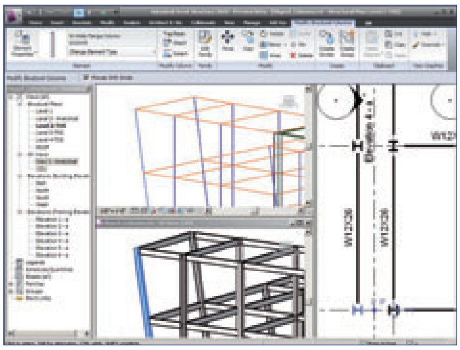
Early signs show a strong logic to the grouping and it is obvious that the UI designers did not bear in mind any of the historical Revit influence on this one, but started with a blank sheet and some impressive ideas.

If you have used any of a myriad of applications including the MS Office 2007 tools then you will know that the Ribbons phenomenon is not unique, but I am guessing that some hefty ergonomics research has shown that it is more efficient. Time, as always, will be the decider from a user perspective.

The big headline is that there is a new concept modelling notion within Revit, with some great improvements to the old Revit form creation and brand new tools; one or two ideas reminiscent of Sketch-Up, but others that probably have a genealogy based in the games and movie world rather than AEC design. So far, I love it.

For Architects, there is a revised curtain walling toolset to sit alongside the new modelling forms, but in true beta fashion, the version I have got my hands on does not want to let me use them! From what I can understand, there is a new type of curtain wall panel, which is classed as a Curtain Panel by Pattern, and which are available as replacements to the standard panels, offering more flexibility.

On the MEP side of things, there are new tools for automatically identifying rooms within a floorplan and improved extraction of room and zone data from the linked Revit Architecture models. Heating / cooling loads analysis and a much improved gbXML interface are also very smart. The ability in a single run to vary the fall of individual pipe runs is one of those quiet little features that are a blessing to the ears of many. The improved interaction with Inventor could prove very useful to the MEP staff as well architects, assuming architects can keep control of the levels of geometry detail.

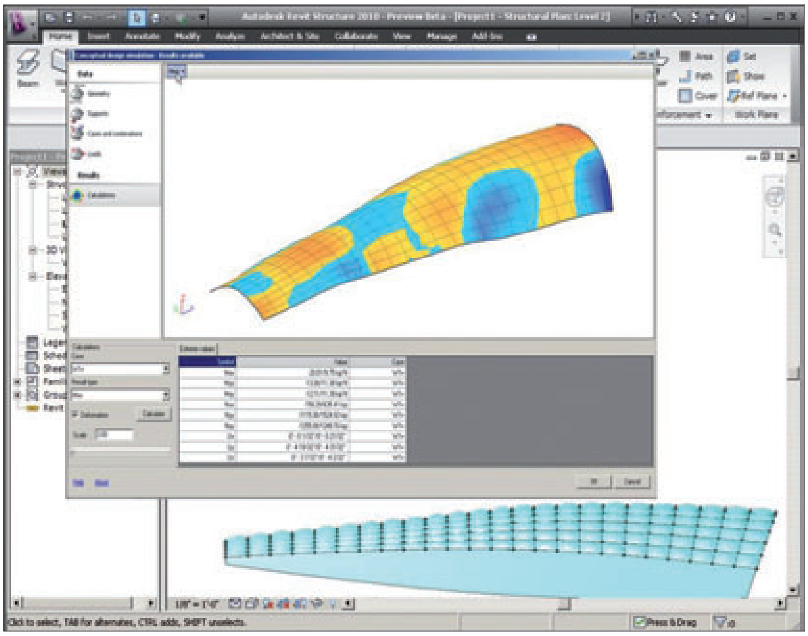


Engineers and drafters can now create slanted columns using the same column families they have used for vertical columns, including physical and analytical characteristics.

Structural fans get sloped columns at last and subscription customers also get the new connection features, which are a great move towards producing a complete model. When used in conjunction with AutoCAD Structural Detailing (ASD) and better links with Robot Structural Analysis there is a very credible workflow incorporating 3D co-ordination models and 2D manufacturing details.

I have not had chance yet to fully explore the bridge tools and the links to Civil 3D promised through the new adsk file exchange format, but I will get my teeth into those in the near future, so watch this space.

While my first impression is fear of the unknown, my second impression is positive. The new UI is different but no-one claimed the old UI was perfect, so as we get to grips with this, we should see worthwhile efficiency improvements. Under the skin, I really like the new modelling capabilities and cannot wait to investigate the small changes and improvements of the less exalted developments.



The new Autodesk Revit Structure 2010 Conceptual Form Analysis Extension allows structural engineers to apply loads and simulate the behaviour of conceptual forms created by architects, enabling them to make more informed design decisions earlier in the project phase.

A healthy overhaul: Pembury Hospital

Autodesk's Revit Structure is used to create a modern superstructure in the large-scale redevelopment of Pembury Hospital in Tunbridge Wells.



In autumn 2006 independent engineering and environmental consultant Gifford's structural engineering team under the leadership of Tony Bassett and the technical guidance of Lee Zebedee worked with Excitech's consultants and trainers to review the relatively new Revit Structure software from Autodesk. After running a detailed assessment it was decided to invest in five seats of Revit Structure to be used on a hospital project that it was undertaking late in 2006.

That project was the new £225m PFI redevelopment of Pembury Hospital in Tunbridge Wells for Kent and Sussex NHS. The proposed redevelopment consolidates Pembury Hospital and Kent & Sussex Hospital into one new, modern facility on the Pembury site.

The new facility, which includes 512 bedrooms, will be the first hospital in the country to have completely single rooms. The new development also boasts 1,200 car parking spaces and a helipad to cater for air ambulances on the upper part of the site.

The project was awarded in December 2006 to the Equion team led by Laing O'Rourke, including architects Anshen+ Allen and M&E engineers DSSR. Gifford was nominated to provide the following design solutions:

- Structural Engineering
- Public Health Drainage
- Environment Development Planning
- Transport Planning
- Vibration Analysis
- Geotechnical Engineering
- Surveying Highways
- Civil Engineering

The proposed solution

The main hospital building with a total floor area of approximately 66,000m², has an in situ concrete frame on RC pad foundations with flat post-tensioned floor slabs and traditional in situ concrete columns and retaining walls.

The structure is braced by concrete shear walls to the stair/lift cores, while its height is squeezed between the rock line and a maximum planning restriction level.

Due to the nature of the sloping site and the planning restriction, the building has been designed to vary between three storeys at the top of the hill and seven storeys at the bottom.

As a consequence of the sloping site, large propped retaining walls, up to 11m in height, retain the earth beneath the building. The ground floors are cast in situ ground bearing or suspended concrete slabs depending on whether they are in a cut or fill condition.

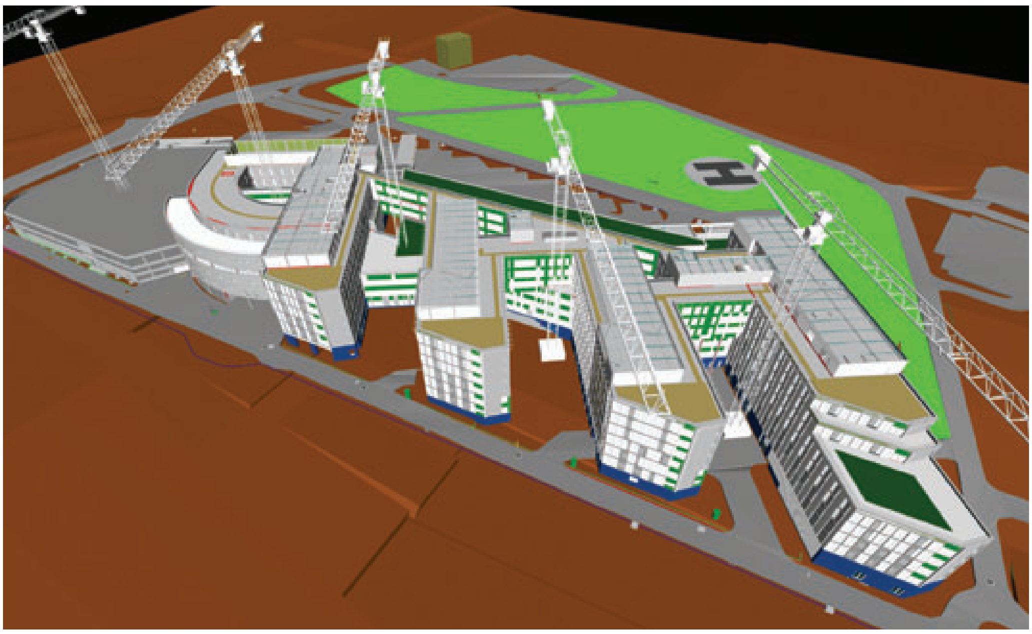
The scale of the hospital dictates that the main building is split into four separate structures with a three-storey split-level independent car park situated at one end of the main building with over 500 spaces.

The main hospital building with a total floor area of approximately 66,000m², has an in situ concrete frame on RC pad foundations with flat post-tensioned floor slabs and traditional in situ concrete columns and retaining walls.

Its top deck will be level with the ground at the entrance to the building. For each floor level cut into the ground, a series of full length retaining walls run along the length of the building cut face, designed to store any excess cut and thus avoid the removal of material from the site.

Notable challenges for Gifford's management and technical team included:

- The use of 3D modelling in all aspects of the hospital design.
- The scale of the project and the structural solution meant their best placed skill base was spread across both national and international offices.
- Shared modelling information across all design team members using disparate CAD systems.
- The site is confined and on a very steep incline, which presents its own inherent issues.
- Very tight schedules i.e. Stage D — Sept 2007, Financial Close — end of March 2008, start on site — April 1 2008, frame completion Spring 2009.



The project approach

Gifford's team received basic Revit Structure training from Excitech in Feb 2007, with subsequent project-related training carried out by the in-house Revit champions.

The structural elements of the project were split over four Gifford offices: Southampton, London, Leeds and Dubai with approximately 25 members of the Structural staff dedicated to the project. This geographical spread was a major factor in considering how to split the model vertically into the following manageable portions.



The proposed redevelopment consolidates Pembury Hospital and Kent & Sussex Hospital into one new, modern facility on the Pembury site.

- Two sub-structure models
- Four acute hospital models
- One multi-storey car park model
- One steelwork model

When completed, each model represented about 20 MB data or 160 MB combined.

Mr Zebedee explains: "We did consider a horizontal split to the models, but due to the manner in which we were attacking the design and the analysis software links, the vertical split suited the process in workable chunks perfectly."

All the Gifford 3D design and visualisation was done in Revit Structure from the very outset, but initially all 2D working drawings were exported from Revit and 'tweaked' in AutoCAD prior to issue. As the Gifford Revit teams gathered size and experience, this practice was quickly omitted with all 2D and 3D data exported directly from Revit.

Mr Zebedee adds: "We surprised ourselves with how quickly we became efficient enough to take AutoCAD out of the equation. It's a big step on a project this size and with the timescales we faced."

As work progressed, the eight separate Revit models were combined on a weekly basis for internal review and co-ordination checking. The use of NavisWorks and in-house video conferencing facilities enabled the team to work over distance in a manner previously unthinkable on a project this size with 50 percent of the structural design and detailing produced overseas.

Mr Zebedee elaborates: "I can't stress enough how important these practices were in making this a successful project. We arranged video conference calls with all four offices involved in the project and could fly around the NavisWorks model with little more effort than walking across the office to have a discussion. The combined Gifford Revit model when exported to NavisWorks reduced in size from 120MB to just under 800KB, making it easy to manage and accessible to all Gifford staff involved."

Additionally, on a weekly basis the combined Gifford NavisWorks model was uploaded to Laing O'Rourke's extranet system where it was merged with the architect's models, M&E external works and Laing's own site models, creating a complete 3D prototype digital building, before being issued back to A-site for all design team partners to review and use.

Gifford downloads this file on a weekly basis for use and to help in co-ordinating decisions.

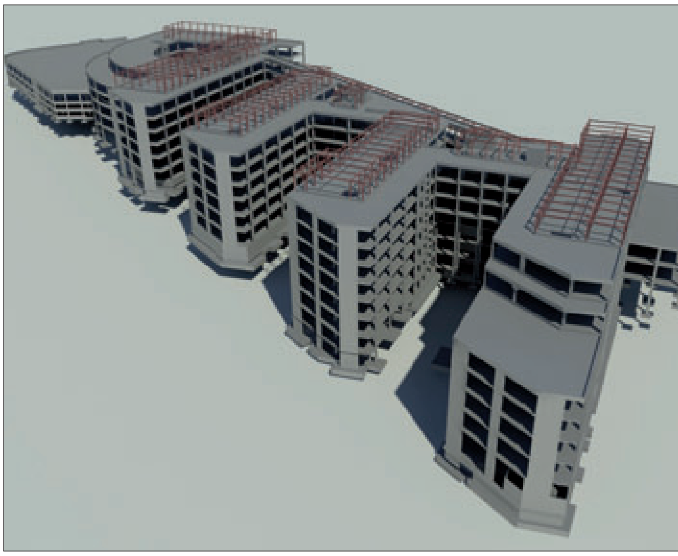
Mr Zebedee recalls one specific situation when the Gifford team needed to introduce an element of vertical support to the top of a stair flight section. The obvious answer was to introduce a short length of reinforced concrete wall within the external façade build-up, but a quick spin round the combined design team model revealed that the panel was a glazed element and a reinforced concrete wall would have been completely out of the question in that position.

Mr Zebedee says, "this is the sort of issue designers face on a daily basis which traditionally on a project of this size would waste a considerable amount of valuable time, sifting through the hundreds of architect's drawings attempting to identify what the façade solution should be for that exact location".

Laing O'Rourke has used the combined models for site planning, site inductions, material take-offs and to set up a project timeline to show the progress the building is making against an agreed construction sequencing plan.

Gifford summary

Mr Zebedee believes that its use of Revit Structure has revolutionised the way Gifford works and praises the ease of use of the product, highlighted by how quickly the team was up and running against a very aggressive time schedule. Gifford currently has Revit Structure for more than 70 CAD seats and the majority of building structures projects are now undertaken in Revit.



As work progressed, the eight separate Revit models were combined on a weekly basis for internal review and co-ordination checking.

Gifford has also invested in Revit MEP, currently available on 27 CAD seats to strengthen its design base and reinforce leadership in sustainable buildings.

Tony Bassett, director of Gifford, says: "The use of Revit Structure, NavisWorks and a whole suite of modelling tools has helped us to streamline our project delivery and speed up the time from concept to on-site information releases. Key improvements have been found in communication, decision-making, accuracy, site co-ordination and inter-office working.

"We invested heavily in both software and training through the duration of the project which places us in a very strong position for subsequent projects and bids.

"This is key to being a leading edge engineering consultancy with the use of CAD design tools supported and assisted by companies like Excitech."

www.excitech.co.uk

Top of the world

StruCad and StruM.I.S .NET combine to deliver the highest project in England and Wales — The Summit Building, Mount Snowdon, detailed and fabricated by EvadX.



The visitors' centre will provide opportunities to learn more about Mount Snowdon, display weather information, advice on descent routes, washrooms and refreshments and shelter.

Transporting over 100 tonnes of steel and more than 2,500 bolts up a mountainside was never going to be easy, but was made a lot more difficult by freak June rainfall. With StruCad and StruM.I.S .NET combined to deliver the detailing and project management tools needed and with sheer determination from the EvadX team, this complex project came to fruition.

EvadX was chosen as the main steelwork contractor for the new Summit Building on Mount Snowdon. The visitor's centre will provide opportunities to learn more about Snowdon, display weather information, advice on descent routes, washrooms and refreshments and shelter.

Andrew Roberts, drawing office manager at EvadX, was the project manager behind the development of the £9 million visitor centre. He said that, even more so than usual, the collaboration between engineer, architect and main contractor Carillion, became vital to the success of the project.

StruCad and StruM.I.S .NET played a vital role in this project management workflow and are integral to operations at EvadX. Andrew says he was proud to have worked on the centre: "You only get to work on maybe one of these in your lifetime, at around 3,560 ft tall it must be one of the highest projects in the country."

Modelled and detailed on StruCad, each phase of the project was subsequently fabricated by EvadX with the aid of StruM.I.S .NET. Material stock, procurement and all project requirements are simultaneously controlled by the StruM.I.S .NET system — with all projects monitored and fabricated using specific EvadX routing and benefiting from best practice work flow delivered by the system. With functionality from estimating through contract and budget control during fabrication, combined with visual production tracking and scheduling, StruM.I.S .NET provided all members of the project with vital up to date information. The StruM.I.S .NET system ensured that the project progressed accurately and with maximum efficiency, which was vital given that the project was due for completion in this extreme location.

Modelled and detailed on StruCad, each phase of the project was subsequently fabricated by EvadX with the aid of StruM.I.S .NET.



The project was erected by the EvadX team after it was painstakingly lifted piece-by-piece up the mountainside on a tiny railway via a small locomotive. This train journey alone from the foot of the mountain to the summit and back took four hours by the time the train had been loaded up, made its way to the top, unloaded and returned to the base.

As a consequence all the parts of the steel structure had to be precisely numbered and distributed in numerical order so that they would reach the summit in the correct order; ready for unloading and construction. If the parts had been sent up in the wrong order the team could have been significantly set back by at least six hours.

However, it was the unusually bad weather that made the job even more difficult. Mr Roberts explains: "The weather conditions were terrible and winds reached 70 mph at the summit and a couple of times the train couldn't get to the workers and they had to walk down the mountain to reach a safe area to be collected.

"We were all delighted that the team managed to finish the construction and erection of the framework on time and sheer determination and hard work were the order of the day."

The team had an unconventional incentive. "I told everyone that if we were able to stay within our budget, I would send up a barrel of beer."

He made good on that promise and delivered a barrel of beer to the workers as reward for the completion of this most unusual and challenging project.

www.acecadsoftware.com

Blast proof

Building blast standards reviewed for safety Finite-Element Analysis software could augment construction guidelines for steel structures.

In 1968, a gas explosion on the 18th floor of a high-rise in London's Ronan Point area blew out a load-bearing wall. All the rooms directly above the damaged apartment collapsed, which then caused the remaining floors below the blast to also collapse.

The event shook the neighbourhood, but it also shook the construction industry. Since that time, in the UK, government safety standards have been instituted to regulate the structure of steel multi-storey buildings so that they can withstand explosions.

"Establishing guidelines that early was both a blessing and a curse," says Professor Ted Krauthammer, director of the Centre for Infrastructure Protection and Physical Security at the University of Florida (Gainesville).

"It was a blessing because the new standards undoubtedly saved lives and protected property, and a curse, because we haven't revised them significantly based on what we have learned about progressive collapse since then."

The safety standards served well for decades, in part because there wasn't much new knowledge in the field of progressive collapse. Since the year 2000, however, there have been extraordinary strides in computer hardware and software that have made complex analyses and simulations possible and affordable.

"Both experimental and numerical data assembled in the past decade have advanced our understanding of building robustness," Dr Krauthammer says. "It's time we did a thorough review of our safety standards for building blast." According to Dr Krauthammer, it is especially important to make Finite-Element Analysis (FEA) a design requirement.

Guidelines vs nonlinear FEA

Real-world accidents, and the terrorist attacks of the last fifteen years, have proven that some of the assumptions behind existing standards for multistorey structures should be re-examined. For instance, engineers and analysts should include vertical loads in their assessment of building safety, even where a single load-bearing element has been damaged or removed.

Dr Krauthammer has been re-assessing building blast guidelines by means of computer models. "We used FEA to simulate the effects of vertical loads on multi-storey structures," Dr Krauthammer says.

"First we modelled steel connection behaviour, then we analysed a ten-storey building subjected to normal and abnormal loading conditions."

Dr Krauthammer and his team used Abaqus/Explicit software from Simulia, the Dassault Systèmes brand for realistic simulation, to assess the behaviour of steel moment connections (joined beams and columns) under dead loads. They also applied loads equivalent to the shock and gas pressures from an appropriate explosive charge in the middle of a room.

When blast pressures were applied to floor and side walls, the predicted global rotations of the beams were frangible (breakable) walls. However, the beams near reflecting walls rotated much more than regulatory computation predicted, transferring greater impulse and energy to the beams and column. All local rotations for the different cases clearly exceeded two degrees.

These findings indicate that extensive damage in the connections comes from the blast radiating in three dimensions as well as the vertically applied pressure.

Deformation data for beams and column in the various analyses indicate that the beam cross sections twisted further due to dead loads.

"Clearly, it is valuable to investigate structural connections using high-resolution finite-element analysis," Dr Krauthammer says. For example, a steel moment connection judged safe based on existing standards failed in the simulations. This suggests that guidelines may need revision to reflect the findings of these analyses.

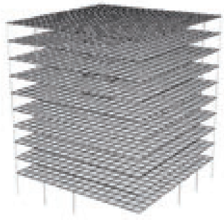
Simulating collapse

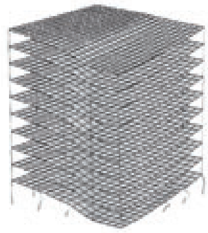
Modelling the collapse of a ten-storey building presented different challenges, Dr Krauthammer points out. "In progressive collapse, local damage leads to large-scale structural failure — an intrinsically transient, nonlinear phenomenon that is hard to model, understand or design against without FEA."

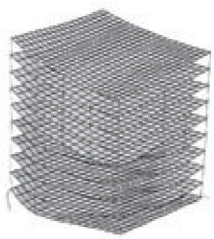
The team used Abaqus to model 10-storey, 3D-moment steel frames with rigid and semi-rigid connections for their sensitivity to material, buckling and connection failures of specific columns. Six initial failure cases with rigid and semi-rigid connections were used to analyse the frames for progressive collapse. The team used both ideal (rigid plus hinge) and semi-rigid connections for the progressive collapse analyses.

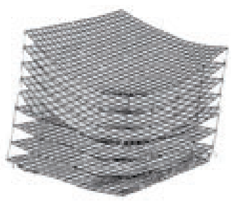
In the simulation with ideal connections, only the case where three columns were removed caused total instant collapse of the building.

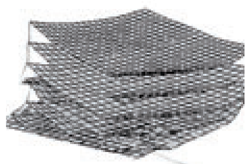
In a case with semi-rigid connections, the building also collapsed, but differently. "We initiated failure at a single connection and it started a cascade of failures," Dr Krauthammer says. As additional connections failed and columns buckled, the floors above the removed columns fell, causing columns to buckle in the sixth floor.


(a) 0.0 sec


(b) 3.94 sec


(c) 4.80 sec


(d) 6.00 sec


(e) 7.20 sec


(f) 8.40 sec

These six successive images from an Abaqus simulation of a multi-storey building show its progressive collapse. One support column (centre-front corner, image a) has been removed. The remaining columns on that floor collapse one by one under the redistributed load above them. A cascade of failures brings down the entire building.

This column buckling initiated a horizontal failure propagation of the columns on the sixth floor and the whole floor failed. After that, the columns in the first floor buckled because the floors collapsed leading to the total collapse of the building.

Even though the ideal and semi-rigid connection cases both caused total collapse for the two cases, nonlinear finite-element results showed very different qualitative behaviour. The collapse of the semi-rigid connection case was caused by a cascade of local failures, such as connection failures and columns buckling. However, the collapse of the ideal connection case was caused by column buckling in the first floor.

The analyses also showed that once failure propagation initiated (i.e. horizontal column buckling across a floor), it would not stop until it caused total, or almost total, collapse. Horizontal column buckling propagation appears to be the most critical factor to control to ensure building safety.

Modelling safer structures

The FEA analyses that Krauthammer and his team performed prove that it is possible to represent the true physical behaviour of steel building structures under actual loading and failure conditions. The analysis results corresponded closely with the data obtained from recent structural failures and collapses. The simulations point the way towards making FEA a required part of guidelines for building design.

The main resistance to changing the standards comes from inertia and the additional cost of analysis, but Dr Krauthammer thinks the results would justify the costs. "Finite element analysis software can predict the behaviour of a structural design," Dr Krauthammer says. "It also can guide civil engineers toward modifications that increase building safety and prevent collapse."

Updating the standards for building blast to include nonlinear FEA results would ensure that the engineers would have a large body of reliable models and data libraries to draw on for future projects.

www.simulia.com

In the driving seat

Metalwork company Littlehampton Welding creates unusual and complex structures with Tekla Structures Building Information Modelling software.

The Goodwood Festival of Speed is famous for its celebration of motoring. The annual hill climb features historic motor racing vehicles and every year it brings together some of the greatest competition cars and drivers from the world of motor sport. Famous faces have included Sir Stirling Moss, Jenson Button, Lewis Hamilton, Fernando Alonso, Nigel Mansell and Mika Hakkinen.

Held in the grounds of Goodwood House, West Sussex, it was first started in 1993 by the present Earl of March in order to bring motor racing back to the Goodwood estate — a location steeped in British motor racing history. From 25,000 visitors at the inaugural 1993 event, attendance at the Festival of Speed has grown to accommodate 150,000 visitors each year.

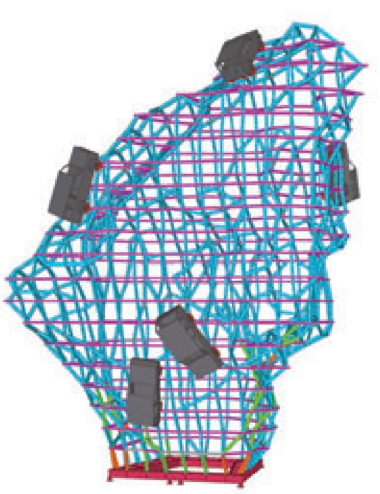
The racing centres outside Goodwood house, where each year a stunning visual display is erected to wow the milling crowd. In 2008 designer Gerry Judah, alongside a structural engineer and metalwork company, Littlehampton Welding, created a crowd-stopping super-structure from 106 tonnes, or 3,415 separate parts of grade S275 mild steel.

The Land Rover Central Feature, built to celebrate the 60th anniversary of Land Rover, rose 35 metres above the crowd and spread out 26 metres in girth. The hollow nest-like display consisted of a lattice-like construction of welded frames with single rakers between the frames.

Featuring five Land Rovers fixed to the steel structure and suspended above the passing crowds, the display was left unpainted to give it a rugged, rock-like texture, as though the vehicles were traversing a particularly rocky terrain.

To secure the cars to the display, a tubular subframe was made for each car. The cars were connected to the subframes with webbing straps around the tyres and the subframes were bolted to the structure. Each car also had a safety wire attached to the structure. The engines and interiors of the cars were removed to reduce weight.

The outstanding design concept was made possible through the use of 3D Building Information Modelling (BIM). Littlehampton Welding used Tekla Structures 13.1 BIM software to simplify a very complex 3D structure onto 2D workshop drawings, which were used to fabricate the structure.



Featuring five Land Rovers fixed to the steel structure, the display had a rugged, rock-like texture, as though the vehicles were traversing a particularly rocky terrain.

The project called for an exacting set of design and build standards to be met. As the structure was intended for display at a specific event, completion beyond the schedule was not an option. The structure had to be fabricated as simply and efficiently as possible, while costs had to be kept to a minimum.

In addition, as the heavyweight structure was suspended above the crowds below, it was vital that it was constructed accurately with no room for error as the safety of visitors to the festival was of the highest importance.

To achieve this, Tekla Structures 13.1 BIM was used to create and share the model with all stakeholders involved in the project. The structure was modelled by a single Tekla Structures user working from a 3D analysis model in DXF file format produced by the structural engineer.

Littlehampton Welding received the DXF model from the engineer and the first fabrication drawings were issued to the works just over a week later. After the final drawings of the car support frames were issued to the works, the build could begin.

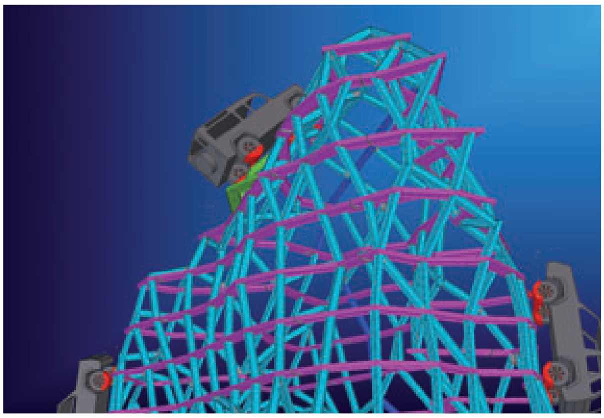
Due to the very tight schedule it was important that the build process start as soon as possible. Fabrication at the lower levels of the structure began while the levels above were still being drawn and the upper sections were being fabricated as the first sections were being fitted on site.



The Land Rover central feature outside Goodwood house towered above the milling crowd.

Steve Horrod, senior draughtsman at Littlehampton Welding, explains the process: "The structure was designed on a 1,500 square grid.

"We accurately marked out this grid onto our steel workshop floor and built each frame to this grid. This saved a lot of time having to keep setting-out each



The hollow nest-like display consisted of a lattice-like construction of welded frames with single rakers between the frames.

"Tekla's 3D model enabled decisions on the location, and position of the cars on the structure to be made, to ensure that a high visual impact was achieved"

Steve Horrod, *senior draughtsman at Littlehampton Welding.*



frame and increased the accuracy of the fabrication.

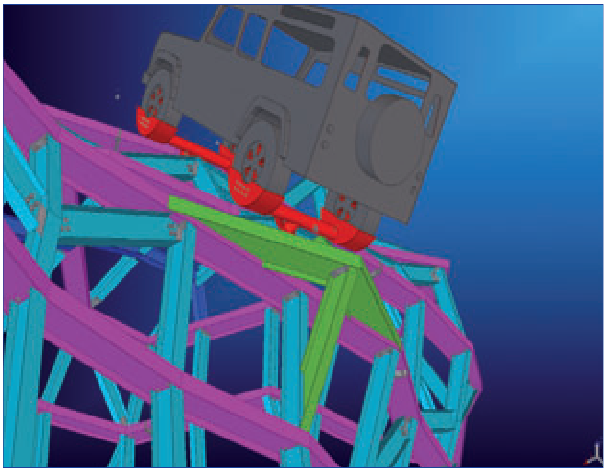
"Having confidence that Tekla's 3D model was correct meant we could start fabrication of the lower frames while still modelling the frames above."

Detailed design plans helped to increase efficiency throughout the project. Visual decisions, such as where to place the cars, for example, were able to be made as the structure was constructed.

"Having a 3D model enabled isometric drawings of each phase to be produced, therefore giving the site erectors a very visual interpretation of the complex structure they were building," explains Mr Horrod.

"Tekla's 3D model enabled decisions on the location, and position of the cars on the structure to be made, to ensure that a high visual impact was achieved," says Mr Horrod. "By taking coloured 'snapshots' of the model this information was easily passed onto the designer for his approval.

"Tekla Structures gave Littlehampton Welding the ability to export parts of the structure as 3D DXF files to enable the engineer to check the model as it progressed without having to produce a lot of extra drawings."



A tubular subframe was made to secure each car to the frame. The cars were connected to the subframes with webbing straps around the tyres and the subframes were bolted to the structure.

That also meant a reduced margin for errors as the build progressed. "Through the 'snapshots', the engineers and designer could see at a glance if there were any particular problems that needed resolving, meaning time saved on site where it mattered most," says Mr Horrod.

The software also allowed Littlehampton Welding to communicate better with its client Land Rover UK by providing 3D images which gave an accurate impression of what the completed structure would look like and to provide an idea of what the patrons at the show would see from their position on the ground.

With improved communication, and a concurrent fabrication and build process, Littlehampton Welding saved six days on site, completing construction in three weeks, and cutting costs on staff and plant hire. The company had planned to work weekends in order to complete the structure within the desired timescale, but found there was no need for it. The goal of creating an eye-catching display piece, ready to be exhibited at the Goodwood Festival, was met on budget and ahead of schedule.

The Land Rover Central Feature was a fitting celebration of engineering and motor sports, which was only just overshadowed by British racing sensation Lewis Hamilton, who starred in the final day's events. Fresh from his British Grand Prix victory at Silverstone, the teenager joined the celebration with a series of demonstrations aboard his F1 car.

Six days later the Land Rover Central Feature was dismantled and removed from the site. The grounds of Goodwood House were peaceful once again, waiting in anticipation for next year's festival and the tests of motoring and engineering it would bring.

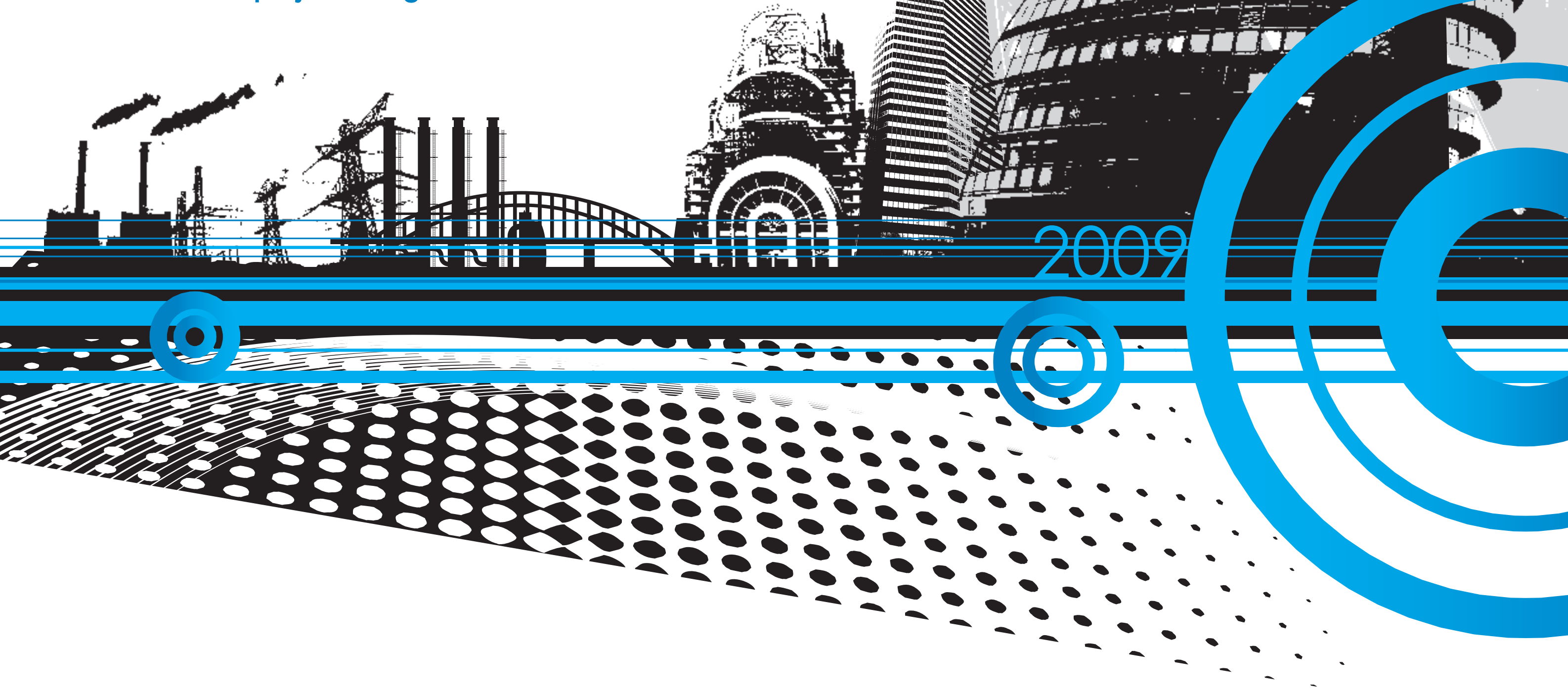
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MEP modelling

BDSP Partnership uses a 3D model-based approach to create coherent, easily communicated building services designs for even the most complex buildings.

Building services account for a growing proportion of the value of many major construction projects. Environmental aspirations, reinforced by increasingly stringent regulations, are driving technological advances. As such, all projects place great importance on the design of these critical systems including renewable energy sources, heating and cooling systems, power systems, water supply, fire and security protection systems and telecommunications.

However, the co-ordination of these building services can be a major headache for all involved in the design process. From the initial design stage, the size and complexity of services have to be taken into account. Plant rooms need to be sized, risers and ceiling/floor voids have to be accommodated and the integration of multiple cables, pipes and ducts throughout the building need to be planned.

"Architects often don't want to be too heavily involved with the design of services in their buildings," says Ivan Jovanovic, environmental analyst for BDSP Partnership. "However, we need to effectively co-ordinate our building services design and installation with the architectural and structural designs; to ensure the required levels of functionality and to produce more efficient buildings."

Model-based designs

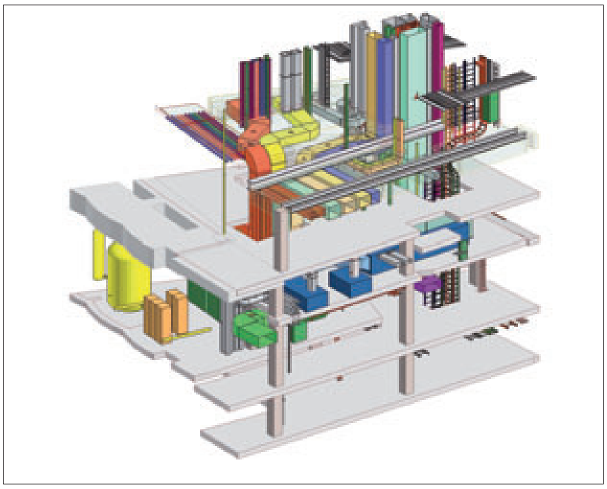
Projects that BDSP Partnership has recently undertaken and modelled in 3D include the detailed design for the Turner Contemporary Centre in Margate and the Silken Hotel in London. It is currently using 3D design techniques with Hopkins Architects on the Velopark for the 2012 Olympics and the International Cricket Centre in Pune (India), and, with Foster + Partners on Central Market, a 750,000 square metre three towered scheme in central Abu Dhabi, which is now on site.

"One of the first jobs on any of these projects is to estimate the plant capacities required and the space that you need to house all the equipment," says Mr Jovanovic. "Then, you have to assess the best layout for distribution services that spread throughout the building. This is difficult to do properly in 2D. However, using the Graphisoft MEP (mechanical, electrical and plumbing) Modeller, we can create 3D models of the services and ensure they don't clash with the architecture and structure."

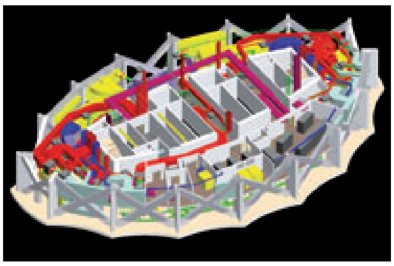
BDSP is modelling all of its current and future projects using ArchiCAD and the complementary MEP Modeller. Its models are frequently praised by architects for both their clarity and the ease with which they explain complex building services systems.



The Turner Contemporary Centre in Margate: ***One of the first jobs on any project is to estimate the plant capacities required and the space needed to house the equipment.***



The Silken Hotel in London: ***BDSP is modelling all of its current and future projects using ArchiCAD and the complementary MEP Modeller.***



Central Market: ***BDSP is working with Foster + Partners on Central Market, a 750,000 square metre three towered scheme in central Abu Dhabi.***

BDSP is typically presented with 2D working drawings by the architect and structural engineers. Its engineers then model all elements of the buildings that they need to work on, creating structural Building Information Models (BIMs) into which they can then 'install' the services.

"If everyone used BIM, architects, engineers and contractors could work together very easily," says Mr Jovanovic. "However, as they don't, we complete our work in 3D models and then simply export it as 2D DXF files for the architect and structural engineer to put back into their own designs and for the contractor to produce installation drawings."

"Our models are often so informative, that they are used by other team members and we tend to become the main co-ordinator on the project because everyone understands the 3D format. Architects, especially, are enthusiastic because it gives them detailed but readily understandable information on these technical aspects of the project."

The next level

BDSP director, Ian Duncombe, says: "Before we used ArchiCAD, we'd typically produce a set of drawings at say 1:200 for concept stages, then another at 1:100 and another at 1:50 as the project progressed, each time discarding the previous drawings and starting over.

"Now, we work on the services design at large scale from the outset, and extend and modify it as we go. On day one, we effectively start work on our final drawings. As the project progresses we add new detail as required, confident that we can produce not only all the information needed, but that our work is fully co-ordinated.

"Using Model-based design and the MEP modeller saves us time and produces information that architects and clients can readily understand, making for better communication and co-ordination.

"Ultimately, I want us to be producing tender documents in the form of a 3D model, rather than a set of drawings. Ideally the base 3D model would come from the architect and we would use this to develop the building services design.

This would become the model that all designers and contractors could work from and ultimately provide the client with the information to maintain the building services when the project is complete. It would have great benefits at every stage."

The use of BIM is becoming more widely accepted now in the architectural profession and the Graphisoft MEP Modeller helps firms like BDSP take co-ordinated building design to the next level. BDSP's experience of how 3D models can help communicate even the most complex of building services designs has helped it to win, and then successfully complete, many high profile and technologically innovative buildings.

www.bdsp.com / www.graphisoft.co.uk

The changing face of design viz

Chris Hobbs, AEC application manager at CADline Ltd, discusses the evolution of 3D visualisation and why considering the 'bigger picture' is now central to good design.

Let me tell you a brief story of my past as a visualiser...

There was a day when we were the 'gods' of the architectural/engineering world. We would walk around the offices with our heads higher than anyone else's, we were paid more, treated better, and had the freedom to come and go as we pleased.

I am sure those of you that are still visualisers are grinning to yourselves while reading this. However, with all of these perks there was a lot of hard work, working late most nights, working to unrealistic deadlines and working with products that weren't compatible. Again, I bet you are nodding rigorously and have a lot more to add to the list.

Why am I telling you this? Revit has brought CAD Technicians into this workflow and as a result they now have to think about how the building actually comes together rather than just create 2D drawings. More thought is now required as this means we can't just 'fudge' a drawing to get it issued and time must now be spent thinking about how the fabric of the materials used will tie together.

There is a huge benefit to this because it means we can automatically extract information from the model that would otherwise need to be done manually. However, it also means that at the very beginning of the project we have to think about more than just geometry.

As a visualiser you have to apply a similar work practice. Planning models is crucial because the way we model the site/object will define what it can be used for.

As an example; if a model was going to be used for an AVI you will spend a lot of time making sure the model is low in poly faces but good enough to look realistic. If creating a single jpeg you will not worry so much about the face count but spend more time on the lighting and environmental settings.

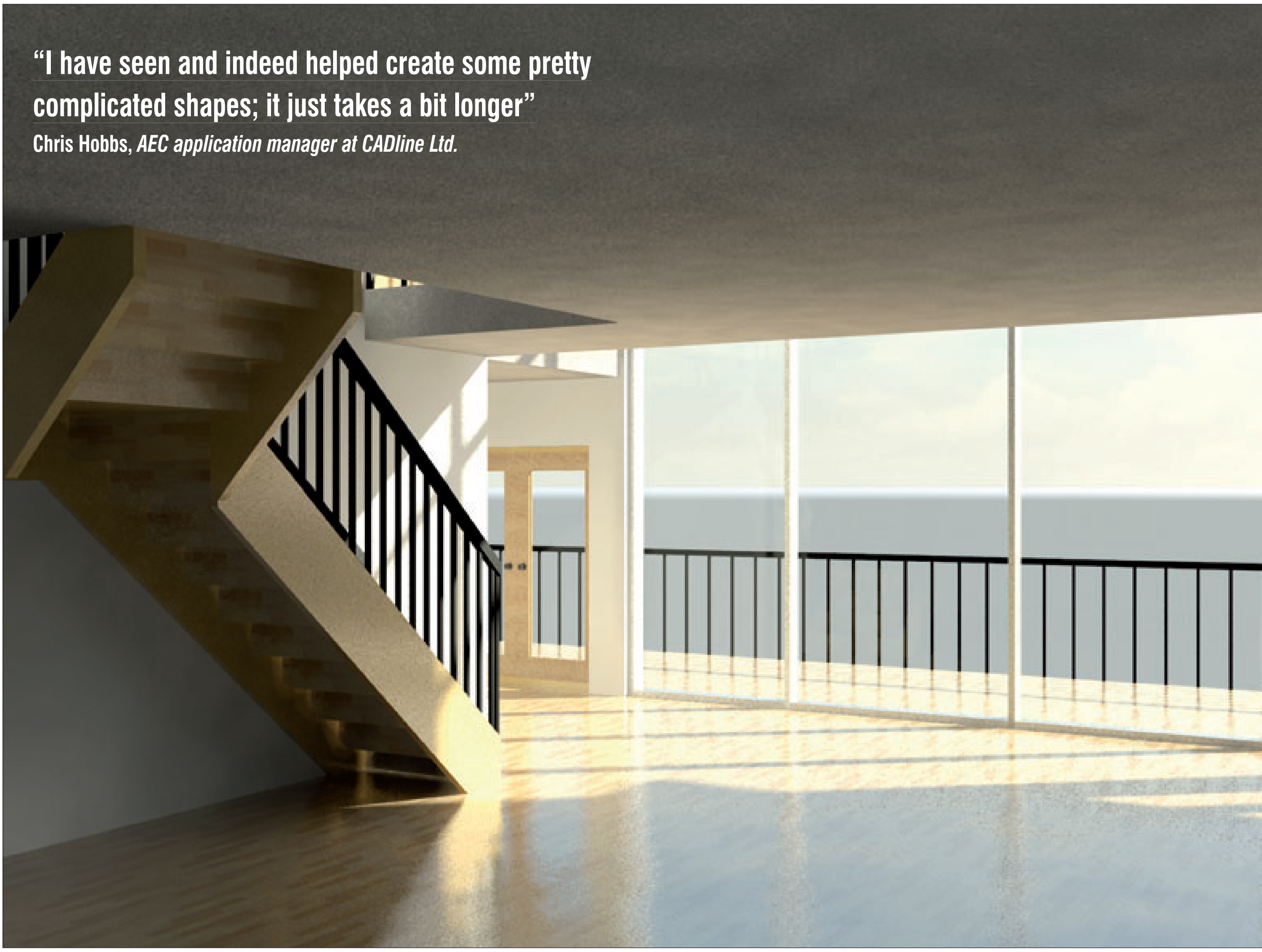
With Revit you need to think about how you are going to set out the model, who will be working on the project, does the file need to be shared? If so, by whom? Will you be sharing the model with other disciplines? If so how? Will you be creating the individual components of an object such as a wall, or will you just create the outline? All of this will determine how you start your model.

A lot of architects now work with products such as Sketchup, Rhino, 3ds Max and even AutoCAD to produce basic 3D models. Historically this information proved useless when the next stage of the project was required; working drawings.

Using Revit as a conceptual model has not always been ideal due to the limitations of the individual modelling tools. We can create fairly complicated

A high-res render from Revit. You can see that though this isn't photo realistic you can achieve a pretty good render.

> **"I have seen and indeed helped create some pretty complicated shapes; it just takes a bit longer"**
> Chris Hobbs, *AEC application manager at CADline Ltd.*



organic shapes, but if we need anything more complicated then we need to rely on the true modellers.

However, I have seen and indeed helped create some pretty complicated shapes; it just takes a bit longer. As an ex-visualiser I am used to having to think about how to model an object and not just dive in with my eyes closed. Creating complex geometry takes patience and a lot of calculations.

If we decide to use 3ds Max to create the conceptual object then we can bring this into Revit, however there are a few things to be aware of. When it comes over, by default it is effectively a 'dumb' object. This means that the object won't be able to stretch, add holes, and convert to another object. It is a static object that resides in the file.

However, it can be used in the various floor plans, and when sections are cut it will cut through the geometry, which means at this stage it is very useable. There is another stage to this, if you bring in your concept shape via a family then you will be able to use the skin of the object to create additional objects such as curtain walling, columns, and beams.

Once a model has been built in Revit we can of course render within the product which will give you a fairly good render. Revit uses the Mental Ray engine to achieve this and has some settings that anyone can use. My only disappointment with this is that it doesn't render very quickly, so if you need an AVI I would either give yourself a few weeks or take it into 3ds Max.

Materials are added by default in all three flavours of Revit (Architecture, Structures, and MEP), therefore if you add a brick wall to your model, the software will automatically add the brick material for you (in the form of a jpeg). These images can be substituted for any jpeg through the element properties. Cameras can be added to achieve a good positional perspective, lighting can be added to the model, and either external or more recently true internal lighting.

If you insert a light fixture from the standard library and select element properties you will see that the true light information has been added and can be modified to suit. When you render the scene you simply choose internal, external or both on the environment settings.

Now visualiser's please pay attention to the next bit. All this information can be exported over to 3ds Max and be used successfully. When you export using FBX the information is packaged up and exported along with the physical model. When importing into 3ds Max the default settings work without needing to be modified, so just hit OK and you will see the information come in. Cameras convert to 3ds Max target cameras, daylights convert to a daylight system, and materials become pro materials in 3ds Max.

Now for bad news. If you are a VRAY user then you will need to convert it to VRAY objects/materials. I suggest, rather than convert all the objects, convert the way you work and life becomes easier.

Conclusion

Visualisers and technicians are now closer than ever with more seamless links between Revit and 3ds Max. This means that as a visualiser I need to think about how I work with these models rather that dismiss them and recreate them from scratch. As a technician I now need to decide if I want to render any of my models in Revit, depending on the client, or do I need to export to 3ds Max, and if so what information will the visualiser require?

As an architect I now have two products that work together so it means I can take my concept ideas and use them from start to finish rather than discard them as soon as I need to produce working drawings.

Revit has now moved into the workflow of a visualiser as we need more than just a single product. We need to think about the bigger picture, we need to think like a visualiser and except that Revit isn't an isolated product that stands on its own.

A Revit expert is now someone that appreciates the complimentary products, and not just thinks about Revit being the tool for all.

www.cadline.co.uk





A typical model that was created in Revit, exported to 3ds Max and rendered with the existing materials rendered. The only objects that have been added after exporting are the chairs and cushions on the sofa. This was achieved within 15 minutes of exporting. The reason for showing this image is that we can produce quick, fairly high quality renders in very little time.



This model shows the standard Revit doors and windows added to the model. The blinds were added in 3ds Max. To create this effect in minimal time I simply created a box for a single slat and arrayed a few hundred times. Rendering time for this image was longer — from start to finish 40 minutes.

Dynamite VSP

Greg Corke reports on a powerful tool for civil engineers that has the potential to revolutionise the role of design visualisation throughout the design phase.

Design visualisation is an established process in many architectural practices and a given for any large-scale development, but visualisation for road and rail civil engineering projects is still seen as a luxury by many.

While high-quality visuals are often put out to specialist third-party design viz bureaus for public exhibitions, when it comes to using visualisation to help drive decision-making in the design process, many engineering firms are reluctant to invest time and money. Being able to create realistic images and animations efficiently is a major challenge in itself, but then you are faced with the problem of how to protect your investment when design changes occur.

Dynamite VSP from 3am Solutions has been designed specifically to overcome these problems by providing civil engineers with the tools to turn complex 3D design data into accurate rendered images and animations quickly and easily. But, more importantly, as the project evolves and alignments and superelevations change, the visualisation can adapt itself to the new design automatically, so little or no rework is required on behalf of the user.

The software harnesses the power of 3ds Max Design, Autodesk's dedicated design visualisation application, but uses a customised user interface aimed squarely at the civil engineer to provide easy access to the most important functions. This simplifies the process so that first time users are not scared off.

Dynamite VSP works with most 3D civil engineering applications including AutoCAD Civil 3D, MX Road, InRoads and Geopak and 12D Model. The most efficient partner application is arguably Civil 3D, because the software automatically recognises Civil 3D components by name and type and is able to automatically apply materials, textures and objects accordingly. With MX Road, for example, each user's or organisations' naming convention must be manually assigned, so careful planning is required to get the best results.

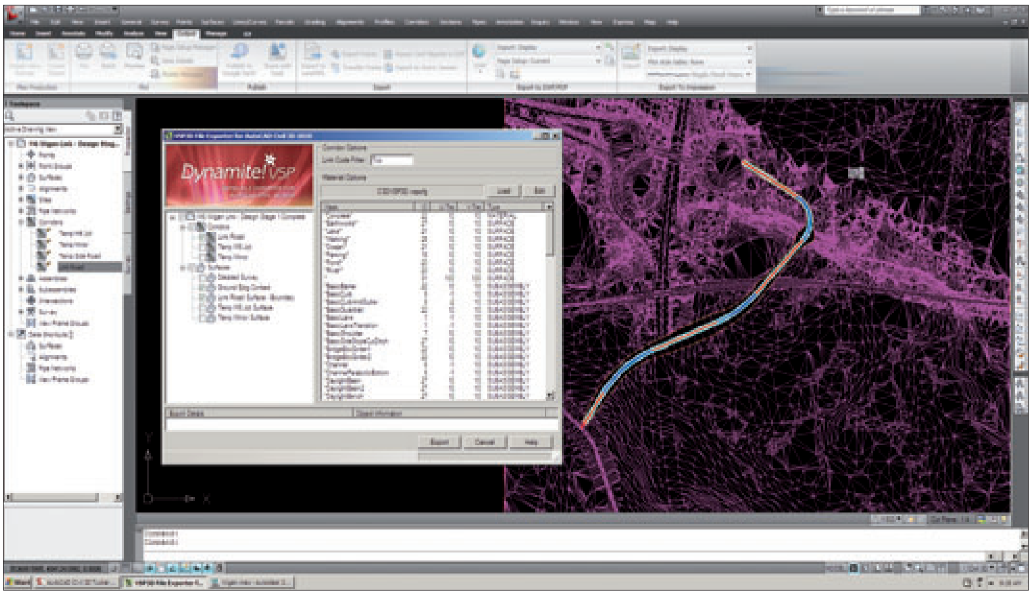
While Dynamite VSP will read in MX data directly into the system, Civil 3D users must first export their data to an intermediary VSP3D file. This is generated by a dedicated Civil 3D plug-in, which is available for free download from 3am Solutions' web site.

One of the golden rules of visualisation is to keep data simple and import only the information you need so the use of a dedicated export plug-in for visualisation purposes also has its advantages as users can strip out unnecessary data at the export stage. For example, while the sub-surface construction of a road may have been modelled in Civil 3D, only the top surface of the road is generally required for the visualisation.

Textures and materials

Realistically mapping textures and materials in 3ds Max Design has traditionally been a time consuming task, but it becomes even more laborious when a design changes and it has to be done all over again. With Dynamite VSP, as the data is imported, it identifies linear features and can automatically apply texture maps and materials for road surfaces and kerbs so they appear realistic when rendered. These are taken directly from Dynamite VSP's library so the user doesn't have to get to grips with 3ds Max Design's material editor if they don't want to.





The VSP3D file exporter for AutoCAD Civil 3D is free to download and is required to get data into Dynamite VSP.

Style definitions

In addition to being able to map materials automatically, Dynamite VSP can also automate the placing of objects in a scene and give users control over the process.

To do this it uses 'style definitions' so when the user carries out an operation, they can save what they've done so it can be recreated instantly at a later date. For example, a camera path can be defined to follow an alignment, road markings generated to always appear on centrelines, or street furniture can line the side of the road at a specific offset.

Over time, the idea is that each organisation builds up a library of styles, which can be applied to different projects as and when required, with very little input required from the end user to populate a visualisation scene.

Most importantly, as all styles can be linked directly to imported Civil 3D carriageway features, if the design changes they will automatically update in relation to the new alignment.

There are four main types of Styles in Dynamite VSP, with dedicated editors for each.



Visualisation of the A26 in Northern Ireland, produced in Dynamite VSP. Image courtesy of Arup / DRD Roads Service, Northern Ireland.

The Object Placement Style Editor can be used to place any type of object along or adjacent to the alignment. This includes lighting columns, signs, gantries, animated cars and cameras.

Cameras form the basis for any animation and while 3ds Max Design offers powerful tools for defining camera positions and paths, Dynamite VSP can define simple camera paths which immediately help users gain a better understanding of the model.

For example, an instruction could be defined which generates a camera 10m above the road and animates it to follow the centreline at a simulated speed of 60mph. This could then saved as a style so it can be repeated on any new stretch of road.

Object Placement styles can also be used to populate scenes with street furniture. For example, lighting columns can be inserted so they automatically follow the centreline of the carriageway at a defined offset and interval along the alignment. The software is intelligent enough to ensure that each bracket arm is placed perpendicular to the centreline.

In Dynamite VSP lighting columns are parametric in nature and height and bracket arms can all be defined. However, if an individual column needs to be adjusted it can be broken out of its group and edited individually.

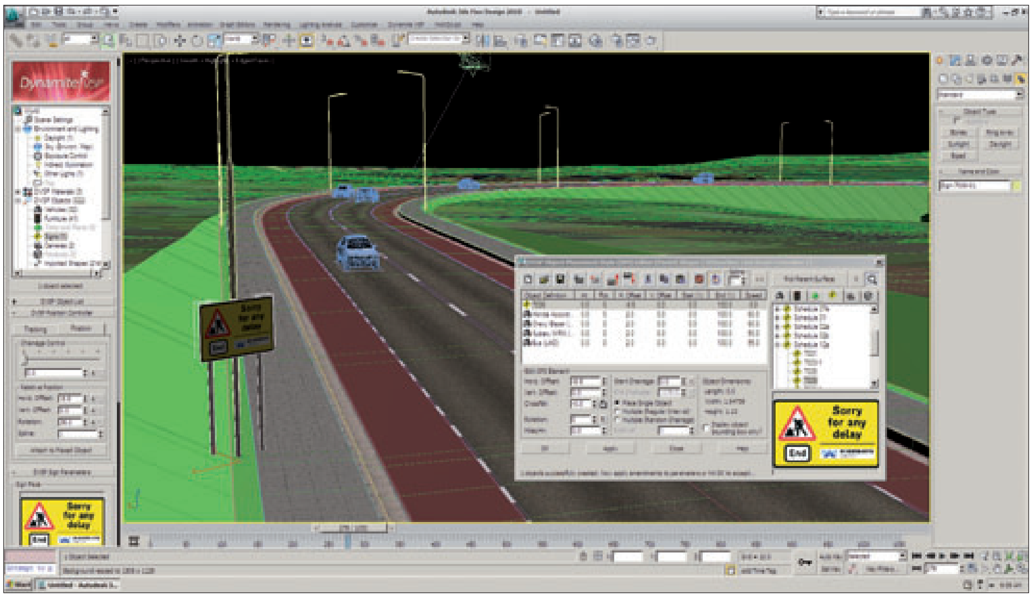
In addition to following a specific alignment, objects can be made to track an underlying ground surface. This capability can be used to animate randomly generated vehicles moving at a designated speed along a stretch of road, ensuring that they follow highway superelevation.

The Swept Object Style Editor is used to model structural objects that follow the alignment such as noise barriers, retaining walls, bridges and tunnels.

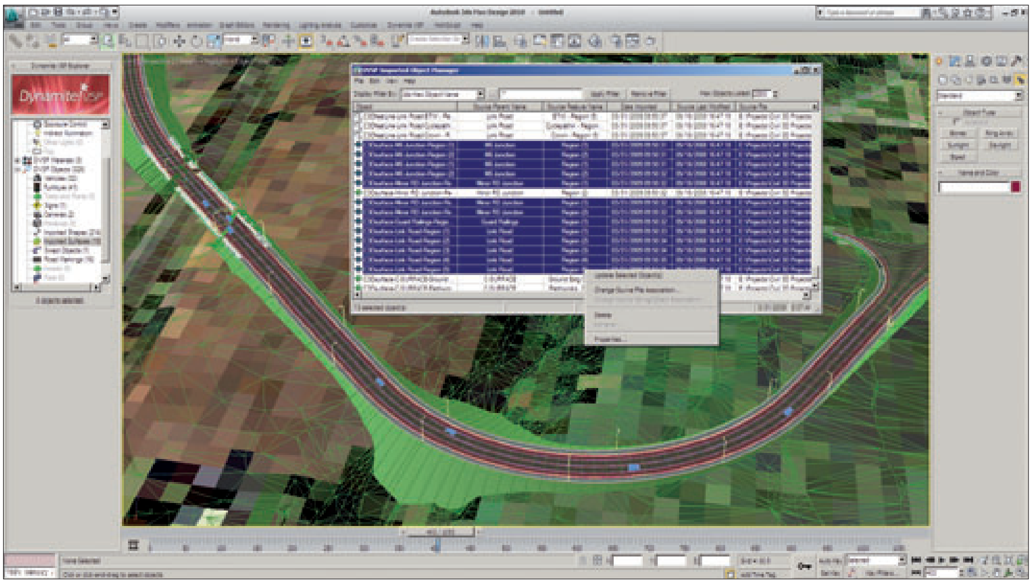
Bridges are an example: built up element by element, in relation to the imported feature lines of the carriageway. Again all parametres that define the constituent parts of the bridge deck profile can be saved to a style to be re-used on any alignment.

Lighting columns, cars, cameras and signs can all be automatically placed relative to the geometry of the carriageway.

The Road Markings Style Editor can be used to associate road markings to specific imported features. For example, any feature can automatically have applied to it a marking of a set distance, width and gap. Over time, a number of these can be built up to a library depending on the road's design type and speed.







Finally, Rail Object Style Editor can be used to define styles for fences, guide rails, and even railway tracks. The profile is modelled by the user, the parameters defined and Dynamite VSP does the rest.

Feature interpretation styles

In addition to being able to create styles and use them interactively, the real power of Dynamite VSP comes into play when styles are directly associated with Civil 3D elements as an integral part of the import process. For example, if a feature line of a certain name is imported, then the system can automatically populate it with any combination of Dynamite VSP style definitions. In effect this enables the user to create a one click visualisation for any new project, which turns it into to an extremely powerful tool. Of course, there will always be adjustments and tweaks to be made, but the foundation for a design visualisation can be set up extremely quickly.

Animation

Once a scene has been set up, it is ready for rendering. As each frame in any animation needs to be rendered, and with fly throughs often running for a few minutes at 25 FPS that's an awful lot of rendering power which can take some time. However, new generation multi core workstations, such as the HP Z800 on page 34, are extremely adept at handling such calculations and network rendering is also supported inside 3ds Max Design so you can make use of spare workstations in out of office hours.

For those that need instant feedback, or perhaps wish to explore their designs in real time, the latest version of 3ds Max Design (2010) has enhanced the quality of real time rendering in the viewport and there are tools, such as VR for Max (www.vr4max.com), which enables users to navigate and interact with fully rendered 3D models in real time.

While not directly related to rendering, it's worth mentioning that 64-bit support in the soon to be released version 4 of Dynamite VSP will also increase capacity for working with larger models.

Dynamite SIM

While Dynamite VSP is able to populate its roads with vehicles, randomly generated in terms of their position, style and colour, there is little science to the behaviour of cars apart from they can be set to run at defined speeds. To add more realism to animations, Dynamite SIM is an optional add-on for Dynamite VSP, which allows real time traffic simulation data from third party applications such as VISSIM (www.ptv.de) to be imported. While VISSIM itself features simple animation tools, by bringing such data into a much more realistic visualisation environment can help engineers to more effectively communicate design in a wide range of traffic and public transport projects.

Product details

Product: Dynamite VSP
Supplier: 3am Solutions
Web: www.3am-solutions.com
Price: From £2,295 (does not include 3ds Max Design, which is required)

Conclusion

The developers of Dynamite VSP have done an excellent job of putting the civil engineer in control of the design visualisation process, something that was previously the reserve of the 3ds Max specialist. The software works on the premise that if you can efficiently produce visuals, and more importantly amend them easily when designs change, then visualisation can become an essential part of the design process and not just a tool for making 'flashy' animations.

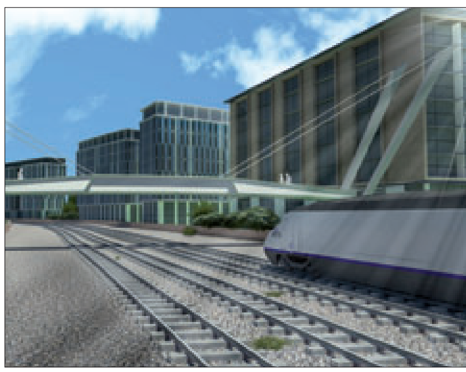
Dynamite VSP not only helps engineers and other stakeholders understand the impact of designs better, but it can also be used to help make specific decisions on anything that involves visual checking. For example, where to position signs and how their placement will impact sight lines.

The beauty of Dynamite VSP is that you can start off with basic visualisation, and then build on your investment as the design progresses. It's incredibly easy to use and while a knowledge of 3ds Max Design is not required, all of the functionality of Autodesk's powerful design viz solution is there should you need to take visuals to the next level.

With this in mind it's not only engineers that can benefit, but even those gifted with 3ds Max skills as it can take make such light work of all the laborious modelling tasks.

In summary, Dynamite VSP is one of the most impressive products I have seen for a while. It's certainly niche, but the way in which it takes a complex process and simplifies it by adapting itself to any design is incredibly clever. Highly recommended.

Top: *Swept Objects, such as this bridge are built up element by element, in relation to the imported feature lines of the carriageway.*
Above: *Any design changes made inside Civil 3D can be re-imported into Dynamite VSP and all light columns, cars, and road markings etc, will be adjusted automatically.*



While highway visualisation is the most common application of Dynamite VSP, it can also be used for railways. Image courtesy of Arup.

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Intel Nehalem processor

Greg Corke takes a look at Intel's impressive new Nehalem architecture, brought to market in the Core i7 and Xeon 3500 / 5500 Series processors, which feature a range of brand new technologies that will help push the boundaries of CAD and visualisation in 2009.

A lot has been happening in the world of processors over the past few months. The big news is that Intel has launched two new chip families based on the brand new Nehalem architecture, which represents one, if not the biggest architectural shifts in Intel processors for ten years. The products in question are the Core i7 and the Xeon 3500 / 5500 series, but it is the Xeon processor that is taking centre stage in the new product ranges from all the major workstation manufacturers, like Dell, HP, Fujitsu Siemens and Lenovo. Core i7, on the other hand, has only been picked up by the specialist workstation builders, such as CAD2, Xworks, Boxx and Scan.

There are many similarities between Core i7 and Xeon, and the most important architectural features are supported on both platforms. Let's first have a look at what these are and what they mean for CAD and design visualisation applications and then follow this up with the differences between the Core i7 and Xeon.

Faster memory

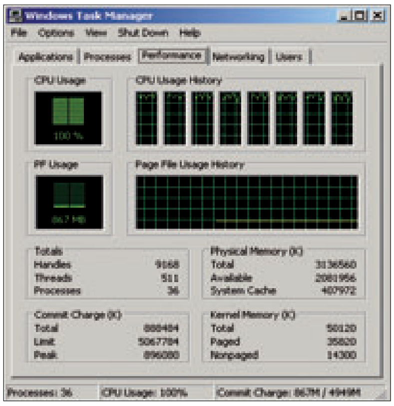
At the heart of this new architecture is a change in the way the chip accesses memory. Instead of the CPU communicating with the memory via the Front Side Bus, Core i7 and Xeon 3500 / 5500 can receive data directly from the system RAM. If this sounds familiar, that's because it is, as AMD pioneered this integrated controller strategy with its Athlon & Opteron processors a few years back.

With Intel's Front Side Bus architecture, which is used on the Core 2 Duo and many generations before, there was a lot more latency when accessing memory. Now with Core i7 and Xeon 3500 / 5500, applications that access a lot of memory, frequently, will see a benefit. This is why AMD's Opteron has remained a popular choice with certain users of simulation software, despite it being slower in most mainstream applications.

The other change in the memory architecture is that the new memory controller has three channels to the RAM which means that Core i7 and Xeon 3500 / 5500 systems will work best when memory modules are in multiples of three, as opposed to two. This means we are likely to see workstations with 3GB, 6GB and 12GB memory instead of the usual 2GB, 4GB, and 8GB.

HyperThreading

All Core i7 and Xeon 3500 / 5500 CPUs have four cores as standard, but they also feature a technology called HyperThreading, which simulates additional



Core i7 processor working flat out on rendering in 3ds Max. Windows Task Manager shows eight CPU cores, which are made up of four physical cores and then four 'virtual' cores simulated with HyperThreading.

threads so each chip actually has eight logical cores. HyperThreading first came to market with the Pentium 4, but was abandoned for the Core 2. It uses spare CPU cycles on each physical core to simulate additional cores, and these can be seen when you bring up the Windows System Performance Dialogue.

The technology only works with certain multi-threaded applications, and can cause confusion when a process assigns itself to a 'logical core' even when there is a physical core sitting around doing nothing. Our tests show that it does make a small but significant difference in rendering applications such as 3ds Max, but won't benefit most CAD / BIM applications directly.

Turbo Mode/Overclocking

Core i7 and Xeon 3500 / 5500 feature a new Turbo Mode technology that can automatically adjust the speed of the cores dynamically. The chip can literally switch off those cores that are not being used and channel additional power to the remaining cores.

Intel claims that for single threaded applications (of which most CAD applications are) the speed of a single core can be boosted by around 300MHz-400MHz.

While Turbo Mode can dynamically adjust the speed of the CPU, specialist workstations manufacturers are looking to get more out of each piece of silicon by overclocking or permanently increasing the speed of chips.

With Core i7 and indeed Core2 Duo, Intel has built in a lot of headroom into its chips. Some say this is because it has no real incentive to sell faster CPUs at this moment in time, because it could jeopardise future sales if the performance leap is too high.

The good news is that those in the know are able to get more out of the chips for no additional cost, overclocking them by around 20 percent.

Overclocking has never really been used in the CAD sector, simply because reliability has been deemed more important than performance. However, even with standard cooling solutions, specialist workstation vendors are now offering overclocked systems. But this is not pony tailed geeks in bedrooms with soldering irons, the system builders are extremely confident that the silicon will not be damaged by overheating and this is being backed up with three year warranties.

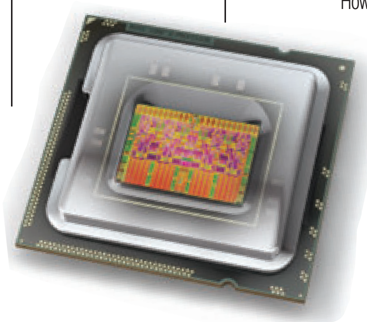
At AEC, we don't expect overclocking to be embraced wholeheartedly by customers, simply for fear of unreliability. However, if confidence grows, and specialist workstation manufacturers continue to push overclocked systems, it will be very interesting to see what impact this has on the Tier One Vendors as the likes of HP, Dell and Lenovo will have to play by the rules and ship systems at Intel's published speeds.

Core i7 vs Xeon

The main difference between Core i7 and the new Xeon is that that Xeon workstations can support two physical processors. This means users have access to a staggering 16 cores (if you include HyperThreading), which is an incredible amount of power to have on the desktop.

However, this is only likely to be of real interest to users of rendering applications like 3ds Max, where accelerating performance can have a huge impact on using visualisation throughout the design process. N.B. There are actually two types of Xeon (Nehalem) processors, the Xeon 3500 Series and Xeon 5500 Series and it is only the Xeon 5500 Series that supports dual socket.

In addition to offering a dual processor capability, both the Xeon 3500 and 5500 Series supports ECC (Error Correcting Code) memory for better accuracy.





Intel's brand new processors: Core i7 (top) and Xeon 5500 (above).

Conclusion

The Nehalem architecture is a huge leap forward for Intel, introducing a number of new technologies, which not only improve efficiency in multi-threaded applications but enhance performance in single threaded applications. As with any new technology, prices are high at the moment but expect significant cuts later this year.

www.intel.com

HP Z Series workstations

It's not often a workstation comes along that makes people sit up and pay attention. The Z Series from HP is not only incredibly fast, but looks sleek and offers customers new levels of serviceability. **Greg Corke** gives his first impressions.

HP new workstation family, the Z Series is something to get quite excited about. This is not just because it features Intel's new, incredibly powerful, Xeon 5500 series processors, but because HP has completely re-thought the workstation and the way it can be serviced, upgraded and generally taken to bits.

To my mind, only Apple and Sun have delivered similar levels of serviceability by those offered in HP's new Z series, which is completely tool-less in design. This was demonstrated at the launch of the new workstations, where HP showed just how easy they were to service and maintain, starting with the flagship Z800.

The whole system relies on clearly marked green levers and clips to give users visual clues as to how to take things apart. HP has done this before but never to this level of simplicity. First of all there are no wires inside the machine! These are all routed behind the back of the motherboard — not only to make things easier, but not to interfere with the Computational Fluid Dynamics (CFD) — optimised airflow throughout the machine. Even the dongles used to power high-end graphics cards, such as the Quadro FX 5800, are routed behind the motherboard and neatly clipped away when not in use.

Everything in the system, from graphics cards to hard drives (and even motherboard), feature innovative mechanisms for easy and tool-less removal. Components that rely on direct electricity, such as the power supply and memory fans, use blind mate connectors, which are funnel-shaped to guide the components into place.

The power supply itself has been completely redesigned, and runs the whole length of the chassis so it can take in cool air from the front of the machine and as a result generate less fan noise. User maintenance and diagnosis has also been improved and should the workstation develop a power problem the supply unit can be removed simply by pulling it out by its handle.



The new HP Z800 workstation features a sleek brushed aluminium chassis.

With its tool-less design HP's New Z800 workstation can be taken to bits in minutes.

Then plugging it into the mains will help the user verify the cause of the problem. If the supply is indeed faulty the green light on the side of the unit will not come on. HP will then ship out a replacement power supply which can be easily installed by the user.

In its quest for even quieter machines HP has also innovated in its cooling mechanisms. Specially designed injection moulded ducting means each CPU in a dual socket machine receives fresh air from the front of the workstation reducing the load and improving acoustics. Dedicated fans for each memory bank also run independently from each other to minimise noise.

For those craving even fewer decibels, a liquid cooling option will be available soon and new Intel solid state hard drives, which not only run quieter than traditional physical drives, but consume less power and produce less heat, will also be introduced. These will increase performance when accessing a lot of data, frequently.

The Z family

HP's new Z workstation series feature three models, the Z800, Z600 and Z400. The entire family is based around Intel's new Xeon processor 5500 and 3500 series (codenamed Nehalem), which feature integrated memory controllers and Turbo Boost Technology.

The Z400 is a single socket machine taking the price/performance position in the range (though HP will continue to produce its Core 2 Duo-based xw4600 for an even lower entry point). The Z600 is a compact dual socket workstation, but for ultimate expandability the Z800 offers up to 192GB RAM and 7.5TB of storage.

All workstations are armed with 1,333MHz DDR-3 memory and new professional graphics solutions have been introduced across the line. These include Nvidia's Quadro FX380, FX580, FX1800, and FX3800, which join the established FX4800, and FX5800 in the high-end machines. The choice of AMD graphics cards has also been expanded over previous generation workstation families with the ATI FirePro V3700, V5700 and V7750 all offered as standard options.



Power saving

HP has made some bold statements about power, claiming that on average its new workstations consume 35 percent less power than similarly configured machines in its previous generation. In terms of power efficiency, all of its power supplies now surpass the 80plus initiative and are now 85 percent efficient. The redesigned 1,100W unit in the Z800 is even 89 percent efficient.

HP has also done a lot of work on power saving and a new hibernate mode called HP WattSaver reduces power consumption to 0.8W, compared to the 2.1W in its previous generation workstations.

Industrial Design

HP engaged BMW DesignWorks as part of its industrial design team and to do the global customer research into what its customers want from workstations. In addition to the totally tool-less design to transform the way users re-configure systems, the Z600 and Z800 feature integrated handles making it easier to move them around on site. Also, because the workstations don't have rubber feet, they can be slid around on carpets and tiled floors.

Styling was also high on the agenda and the 'design language' developed by DesignWorks expresses clean lines and premium materials. The grill that runs down the entire front of the Z600 and Z800 was made possible by incorporating a slot loading optical drive and brushed aluminium side panels also feature. Finally, with its injection moulded components, the machine also looks elegant from the inside, as opposed to the usual mess of wires and clips.

Conclusion

With the introduction of the new Xeon 5500 Series, it's an exciting time for workstations in general, because performance is about to go through the roof, particularly when users are multitasking or running multithreaded applications like 3ds Max.

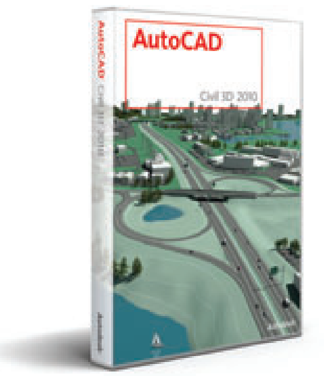
However, while this level of performance will be seen across new product introductions from all the major workstation vendors, what makes HP stand out from the crowd at this moment in time is its innovative approach to chassis design, which looks set to make the servicing of workstation an absolute breeze. We'll be putting the new workstations through their paces in the coming months, so stay tuned.

www.hp.com/workstations

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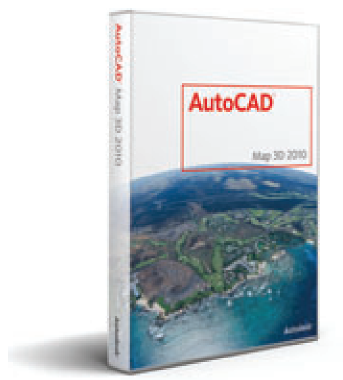
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Dynamite!™ VSP

High quality visualisations of your AutoCAD Civil 3D or MX project designs are now easier than ever before with Dynamite VSP, from 3am Solutions (UK) Ltd.

Specifically designed for the needs of civil engineers, Dynamite overcomes the problems of updating the visualisation model in response to changes in the design model by linking the two together.

Design visualisation and communication with project partners throughout the design cycle is easier and more effective than ever.

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